THE MORBID ANATOMY, PATHOLOGY, AND TREATMENT OF HERNIA.

HUNTERIAN LECTURES

ON THE

MORBID ANATOMY, PATHOLOGY,

AND TREATMENT

OF

HERNIA.

BY

CHARLES BARRETT LOCKWOOD, F.R.C.S.,

HUNTERIAN PROFESSOR, ROYAL COLLEGE OF SURGEONS OF ENGLAND; SURGEON TO THE GREAT NORTHERN HOSPITAL; SENIOR DEMONSTRATOR OF ANATOMY AND OPERATIVE SURGERY IN ST. BARTHOLOMEW'S HOSPITAL.

36 *Illustrations.*

LONDON

H. K. LEWIS, 136 GOWER STREET, W.C.

1889

TO

ALFRED WILLETT, F.R.C.S.,

SURGEON AND LECTURER ON SURGERY TO ST. BARTHOLOMEW'S HOSPITAL,

THIS BOOK IS DEDICATED

BY THE AUTHOR,

AS A MARK OF RESPECT AND IN ACKNOWLEDGMENT OF MANY ACTS OF KINDNESS.

PREFACE.

As Hunterian Professor I had the honour to deliver these Lectures at the Royal College of Surgeons of England, in May, 1889, and they are now reprinted from *The Illustrated Medical News*, in which they have already appeared. I take this my earliest opportunity to thank the editors and proprietors of that journal for their courtesy, and for the liberality with which they have published and illustrated these investigations. The figures, with a few exceptions, which are duly acknowledged, have been made by myself from the specimens.

C. B. LOCKWOOD.

19, Upper Berkeley Street,
Portman Square, W.

CONTENTS.

THE MORBID ANATOMY, PATHOLOGY, AND TREATMENT OF HERNIA.

LECTURE I.

Introductory.

In the following lectures I propose to give the result of an attempt which I have made to ascertain how far the peritoneum and suspensory apparatus of the abdominal viscera are concerned in the pathology of hernia. Afterwards some questions with regard to the morbid anatomy and pathology of hernial sacs will be discussed.

The last branch of the subject has been exhaustively studied, as is witnessed by the works of Scarpa, Cooper, Cloquet, Lawrence, and of others too numerous to mention; but the contrary, I shall endeavour to show, is the case as regards the relation which the peritoneum and suspensory apparatus of the viscera bear to the morbid anatomy and pathology of hernia. Our information about this is incomplete and in need of further elucidation.

Mr. Kingdon * has given one of the best expositions of this branch of the pathology of hernia, and places the questions at issue very clearly, as is evidenced by the following quotation from his essay :—

"The prevailing view of the causes and nature of hernia —that of Scarpa and his followers—may, for convenience, be called the 'mechanical;' the other, of which Richter was the most famed exponent, may be called the 'pathological.' The

* "On the Causes of Hernia," by John Kingdon, Medico-Chirurgical Transactions, vol. xlvii., p. 295 *et s.*

supporters of the 'mechanical theory' assert that the abdominal viscera are maintained in their several positions by the pressure of the muscular parieties, and that the mesenteries, ligaments, and peritoneal folds are nutritive attachments rather than mechanical supports; that the intestines are normally prone to displacement, and that hernia depends upon a loss of balance between the muscular power of the parieties and the resisting power of the fibrous fabric of the inguino-crural aponeuroses.

"The advocates of the 'pathological theory,' on the other hand, maintain that the intestines (with certain exceptions, that need not now encumber the argument) are not prone to displacement in the normal and healthy condition of the mesenteries, ligaments, and peritoneal folds. They agree that the protrusion is the result of the mechanical action of the muscular parieties, but hold that the intestines do not come within the sphere of that expulsive action until they have descended somewhat in the cavity of the abdomen, either by relaxation, hypertrophy, or other lengthening of their attaching membranes."

Thus, according to Mr. Kingdon, and to put the matter briefly, one school of pathologists believes that in hernia the fault is in the abdominal walls; the other that it is in the attaching membranes of the intestines, the abdominal walls playing a secondary part. The questions at issue, therefore, are quite simple, and a moment's consideration shows the importance of a correct solution of them. We may infer that surgeons who deal with the hernial sac and the abdominal wall in cases of non-strangulated and strangulated hernia do so because they agree with Mr. John Wood * that the fault lies in the abdominal wall, whilst those who refrain say they do so because they think the prime fault is not in the abdominal wall, but in the peritoneum and mesentery. This uncertainty has hitherto deterred me from operating for the cure of hernia, except in special cases; and what follows has been undertaken with the object of doing away with this uncertainty. I need not speak further of the bearing of this problem upon surgical practice; but before giving the results of my own investigations, it will afford a better idea of what has been done, and of what remains to be done,

* "On Rupture—Inguinal, Crural, and Umbilical," London, 1863, p. 31.

if I endeavour to set forth, in as few words as possible, that which we already know.

The Pathological Theory.

The quotation which has been given from Mr. Kingdon's essay refers to relaxation, hypertrophy, or other lengthening of the attaching membranes of the intestines. A great many arguments are adduced from the works of Richter, Lawrence, Rokitansky, from the tables of the City of London Truss Society and elsewhere, to support the propositions "that all cases spring fundamentally from . . . a fault in the peritoneum;"* and "that hernia is a disease, and not an accident; a pathological condition, and not merely a mechanical lesion; that although the proximate cause is mechanical, the remote, predisposing, real cause is pathological."† These propositions, which seem to have met with a general acceptance, are supported by evidence which, in my opinion, fails to convince because it is deficient in anatomical proof. Take, for instance, that which Richter has written upon this particular point: "This weakness, the predisposing cause of hernia, consists either in a preternatural laxity of the peritoneum, which, in regions unsustained by the abdominal muscles, as at the ring, yields to distension, or in a relaxation and a preternatural extensibility of the mesentery, and of all parts which maintain the abdominal viscera in position."‡ A preternatural laxity of the peritoneum is perhaps difficult to measure, but a relaxation and preternatural extensibility of the mesentery might be thought to produce results susceptible of description or measurement; nevertheless I am unable to find such descriptions or measurements in Richter's works. Nor is more definite information contained in the works which are often arrayed in support of this line of argument, and this applies to Morgagni, Wharton, and others,§ from whom Richter seems to have derived his ideas.

Further, the pathological school assumes‖ that the mesentery

* *Loc. cit.*, p. 309.

† *Loc. cit.*, p. 313.

‡ Richter, "Traité des Hernies," translated by Rougement, 1808, p. 10.

§ Morgagni, "The Seats and Causes of Diseases," trans. by Alexander, Letter xliii., art. 13, p. 561.

‖ Camper was also of this opinion. "Icones Herniarum," 1801, p. 11.

will not permit a protrusion of the intestines until it has undergone elongation.

It might have been imagined that the assumption that the mesentery is elongated in hernia could easily have been proved or disproved by a simple series of measurements, but as far as can be ascertained it has been allowed to rest upon such arguments as the following, used by Mr. Kingdon: * "If the intestines were always in a condition ready for protrusion as soon as a fault in the parieties allowed it, it must of necessity follow that whenever the tunica vaginalis remains sufficiently patulent hernia must invariably occur. But it is well known that this is not invariably the case. In the autumn of 1859 Mr. Stanley removed a cancerous testicle from a patient in St. Bartholomew's Hospital. During the operation it was found that the tunica vaginalis and the peritoneum formed together one continuous cavity. The communication was free enough to admit the finger easily within the serous cavity of the abdomen. Yet there had never been any hernia before the operation, nor, when the man left the hospital with a sound cicatrix, was there any unusual impulse to be felt at the ring." Further, "Among females, too, the diverticula of Nuck are acknowledged, even by Malgaigne, to be as often open as the tunica vaginalis, yet hernia is less frequent." Without endeavouring at present to discuss the value of such evidence as the foregoing, I would observe that the author from whose writings the quotation is made gives no actual measurements of mesenteries—either long or short—nor does he give any references to any which may have been made by others.

On the other hand, the primary assumption, that unless it has become elongated the mesentery prevents protrusion of the intestines, is weakened by Malgaigne's † assertion that the contrary is the case; but this, again, is little more than a statement of opinion, and has rightly been taken exception to.‡

* Kingdon, p. 301 *et s.*

† "Leçons Cliniques sur les Hernies," Paris, 1841, p. 10.

‡ Kingdon, p. 296.

Writers upon surgery constantly refer to elongation of the mesentery as a predisposing cause of hernia. Mr. Treves * says, "There is another possible congenital defect that may predispose to hernia, viz., an abnormally long mesentery. If, in the dead subject, the inguinal canal be opened up, and an attempt made to draw a piece of gut down from the abdomen into the scrotum, it will be found it cannot be done, owing to the shortness of the mesentery. In cases of scrotal hernia, therefore, the mesentery must become lengthened, and it is a question whether or not an abnormally long mesentery may exist as a congenital defect, and so predispose the patient to rupture. More information is required upon this subject."

Here, again, the case depends upon circumstantial, rather than direct, evidence; and a further surmise is introduced, namely, that the supposed elongation may be congenital. However, I think that every one will agree with the concluding remark, to the effect that more information is required upon this subject.

Mr. Birkett's remarks upon this branch of the subject are in the same direction.† This esteemed author speaks of an abnormal elongation of the mesentery, and goes on to say, "It is a question whether a portion of small intestine can reach the fundus of the scrotum, unless its mesenteric ligament be of preternatural length. For it is difficult to understand how the upper portion of the small intestine or the cæcum can descend so low as they are sometimes seen, without at the same time their mesenteric folds being elongated. But the fact to be accurately ascertained is whether the mesentery is abnormally long antecedent to the descent of the hernia; whether, in truth, a morbid elongation of the mesentery be a primary cause of hernia or not. Doubtless this structure becomes lengthened and stretched as the result of repeated or continued descents of the intestine; but we are not cognisant of any facts to prove a congenital condition of the kind alluded to."

Scarpa, who has been called the leader of the "mechanical school," does not deny elongation of the mesentery, as is shown

* "Surgical Applied Anatomy," Treves, 3rd edit., 1888, p. 308.

† Article on Hernia, Holmes's "System," vol. iv., 2nd edit., 1870, p. 648.

by the following quotation from his works:* "An intestine cannot be removed from its natural situation but in so far as it is permitted by the unnatural elongation of that portion of mesentery to which the protruded intestine is attached. But it does not result from this, as a necessary consequence, that the relaxation of a portion of the mesentery must precede the formation of the hernia, rather than that it should be simultaneous with its appearance." He then proceeds to argue that under certain mechanical conditions "the concentration of the compressing muscular forces will act simultaneously upon the intestine and upon the corresponding portion of mesentery, which portion of membrane will be similarly, and at the same time, relaxed and elongated in proportion as the intestine is protruded out of the abdomen to form a hernia." †

As I proceed some additional evidence in support of the views of the pathological school will be forthcoming, but that which has been given is sufficient to show that the matter is in need of further investigation.

Statistics of Radical Cure.

The statistics which have been published to show the result of operations cast an uncertain light upon the pathology of hernia. The latest are those given by Mr. Mitchell Banks,‡ in November, 1888. His table, which is evidently drawn up with candour and impartiality, tabulates the result of 116 operations upon strangulated and non-strangulated herniæ, in which efforts were made to obtain a permanent cure. "(1) Of the 100 cases of moderate-sized non-strangulated and strangulated herniæ combined, it has been possible to trace for very considerable periods 77. Of these, 48 remain quite sound, 17 are partial successes, and 12 are complete failures. (2) Of the 16 cases of very large and enormous herniæ, it has been possible to follow up 10. Of these, 5 remain practically sound (though all

* "A Treatise on Hernia," by Antonio Scarpa, translated by Wishart, 1814, p. 43.

† *Loc. cit.*, p. 45.

‡ Most of these cases were published in the *British Medical Journal*, Dec. 10, 1887, p. 1,260.

requiring support to prevent return), 3 are partial successes, and 2 are complete failures."

It is not proposed at present to dwell upon these cases. Those which were cured proved that there are cases in which it is possible to strengthen the abdominal wall and render it secure; but, be it noted, they do not prove that the sole lesion is in that structure. In any case Mr. Banks's statistics incline one to suppose that, with the exception of cures of large or enormous herniæ, we are not in possession of data which enable us to discriminate between cases which will be successful and those which will not. The experience of others bears out these inferences. Mr. John Wood* speaks of having performed the operation for the radical cure of herniæ more than 200 times. In 107 of these the result was more or less perfectly known, and was more or less unsuccessful in 51. The 56 successful cases were noted at periods varying from thirteen months to eleven years after the operation. Thus Mr. Wood's experience is almost in accord with that of Mr. Banks. Dr. Macewen† has also tabulated 80 operations for the cure of hernia in strangulated and in non-strangulated cases. This surgeon's results are exceptional. Yet we note that 5 required to wear an apparatus after the operation. It is, of course, difficult to arrive at their ultimate success, and the above estimate is probably too favourable. Mr. Mayo Robson‡ has also given the results of his experience, and in 26 cases of strangulated and non-strangulated hernia, in which he endeavoured to achieve a permanent cure, 6 required a truss after the operation. This seems a large proportion compared with Dr. Macewen's, but the reason of this is, as will be seen later, in the nature of the cases.

At the congress of French surgeons in 1888 Professor Socin said he operated upon 85 cases of strangulated hernia, and upon 75 non-strangulated. There were 11 deaths in the former class,

* The address on Surgery at the annual meeting of the British Medical Association, London, 1873, *Lancet*, part ii., 1873, p. 185 *et s.*

† "On the Radical Cure of Oblique Inquinal Hernia by Internal Abdominal Peritoneal Pad and the Restoration of the Valve Form of the Inguinal Canal," *Brit. Med. Journal*, Dec. 10th, 1887, p. 1,263.

‡ "A Consecutive Series of Twenty-six Operations for the Radical Cure of Hernia," by W. Mayo Robson, *Brit. Med. Journal*, Dec. 17th, 1888, p. 1,324.

and two in the latter. 133 of these cases had been examined a year, and up to nine years after the operation for their cure, and whilst 83 had been cured, all had been benefited.

Taken altogether, the tables show that the operation for the permanent cure of hernia is upon an unsatisfactory basis. Their results are such that they support either the "mechanical" or the "pathological" schools. Those which are successful merely show that the fault in the abdominal wall is capable of remedy; the unsuccessful, that the remedy is inadequate, or that the fault is elsewhere.

Range of Movement of the Intestines.

The range of movement of the intestines is a matter of contention. Malgaigne's* somewhat inexact statement that "the mesentery permits them (*i.e.*, the intestines) to pass beyond the limits of the abdominal walls" has been questioned by Mr. Kingdon† and others. Mr. Treves‡ writes that "if the fresh body of an adult be opened, and the condition of the viscera and peritoneum be normal, it will be found impossible to drag a loop of small intestine through the femoral canal (artificially enlarged) on to the thigh, or down the inguinal canal into the scrotum. In fact, no coil can, in any part, be drawn out of the abdomen below a horizontal line on a level with the spine of the pubes. It is evident, therefore, that in femoral or scrotal hernia the mesentery must be elongated." Mr. Treves goes on to say that a long and loose mesentery is not infrequent in women past middle life, and that the same applies in a less degree to old subjects of both sexes. The foregoing quotation calls for a word of criticism, for it is evident that the intestines might fail to touch "a horizontal line on a level with the spine of the pubes," and yet reach beyond the crural arch. In the next place, in those cases in which the intestines do extrude, supposing that extrusion does not happen under normal conditions, an elongation of the mesentery is not the only thing which would permit such an occurrence. Before the end of these lectures I hope it will be shown that

* "Leçons Cliniques," p. 29.

† *Loc. cit.*, p. 296.

‡ Hunterian Lectures on Intestinal Canal, etc., p. 27.

there is another alternative, namely, a prolapse of the mesentery, permitted by elongation or defect of its suspensory apparatus.

In dealing with this question, besides the mere length of the mesentery, a number of equally important questions have to be taken into consideration. For instance, it is stated that the attachments of the mesentery to the hinder wall of the abdomen are not always the same. Mr. Wood says, "We find in the dissecting-room that there is great variety in the position of the attachment of the mesentery to the spine. It is often attached to the posterior part of the abdominal wall, one or two vertebræ lower than usual." * Mr. Treves,† in his Hunterian Lectures, says that the point at which the attachment of the mesentery commences is practically constant, but that its end is uncertain. Therefore, authorities are not agreed upon this point, and yet its importance will, I trust, soon be sufficiently obvious.

Thus, we have three main questions to deal with, namely, the length of the mesentery, the attachment of the mesentery, and the range of movement which the mesentery permits to the intestines; out of these arise other problems of equal importance, and, amongst others, the means by which the mesentery is upheld, and the value and uses of its supporting apparatus. A correct solution of these questions is, in my opinion, an essential preliminary to a correct appreciation of the pathology of hernia, and, I would add, to its scientific treatment.

A Standard of Comparison Necessary.

Since our works on anatomy and surgery do not, so far as can be ascertained, afford information about most of the foregoing essentials, I am obliged to devote a part of these lectures to the construction of a standard of comparison by which to judge of the elongation, prolapse, or other abnormality of the mesentery. It is clear that if this standard of comparison is to have scientific value it must be based upon measurements, and these, again, must be taken from a long series of cases. The endeavour to fulfil these conditions has been laborious, and as the work proceeded new questions arose, each of which called for an

* "On Rupture," p. 31.

† *Loc. cit.*, p. 24 *et s.*

answer by means of additional measurements. On this account some of the earlier observations, although affording information, are less complete than those which were made later.

Method of Investigation.

The following plan was adopted for obtaining the various measurements, and to obtain uniformity a definite routine has been adhered to. Whenever it was possible the name, age, sex, and occupation of the subject was ascertained, and then, the body lying straight upon its back, its length from head to heels was measured, and any peculiarities in shape of the abdomen or of the thorax were noted. Next the abdomen was opened in the usual way, and the condition of the abdominal rings and of the hypogastric fossæ was observed, also any displacement of the stomach, liver, spleen, or kidneys. The great omentum, colon, and transverse mesocolon were then thrown upwards over the thorax, and the disposition of the cæcum, right, middle, and transverse colons, and of the sigmoid flexure examined. To measure the height of the transverse mesocolon and of the highest attachment of the mesentery a line, which I shall hereafter call the "base line," was marked by stretching a string across the abdomen from the highest point of one iliac crest to the highest point of the other (*vide* fig. 1). As a rule a string held in this position passes through the umbilicus, but sometimes the umbilicus is half an inch higher or lower; its variations in this respect, however, are very trifling. The length of the mesentery itself was always measured at its widest part, and, as a rule, the measure was applied opposite the body of the third lumbar vertebra. In the measurements which are given below the width of the intestine has been included in the length of the mesentery; this was done to make these measurements uniform with the next, namely, those intended to show the range of movement permitted to the intestines. Here, again, it seemed desirable to use definite landmarks, and therefore the anterior-superior spines of the ilia, the crural arches, and the spines and crests of the pubes were chosen. The relation of the intestines, more particularly of the small intestines, cæcum, and sigmoid flexure, to these landmarks was judged by

drawing them downwards until their mesenteries and attachments just began to resist, after which the distance from the landmark to the free border of the intestine was measured. I need hardly say that the greatest care was taken to ensure a fair and correct result.

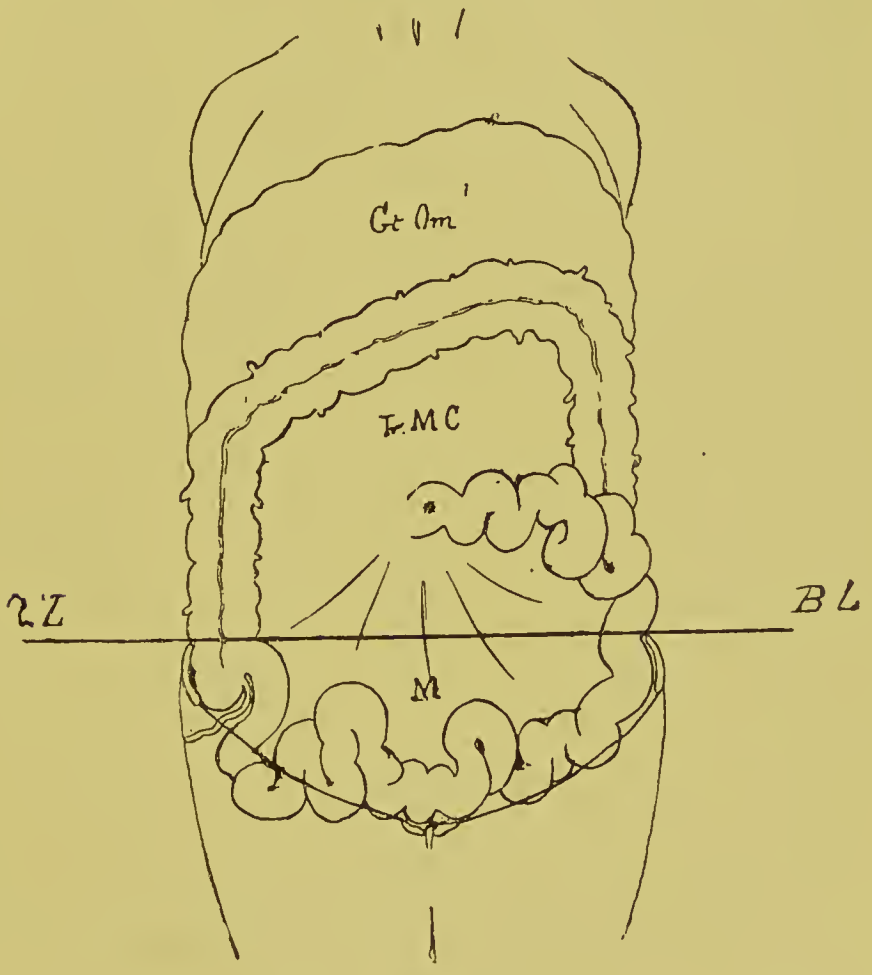


Fig. 1.

Figure to show position of Flexura Duodeno-jejunalis and Transverse Mesocolon. B.L., Base line. Gt. Om., Great Omentum. .M.C., Transverse Mesocolon. M., Mesentery. * Flexura Duodeno-jejunalis.

To facilitate the recording of the various measurements it was found expedient to prepare a printed sheet, which besides giving headings for name, sex, age, occupation, height, length of mesen-

tery, length of transverse mesocolon and great omentum, weight of small intestines and mesentery, weight of large intestines, condition of abdominal walls, also gave room for other notes, and had a simple diagram, such as that which is given below (fig. 2), wherewith the distance of the transverse mesocolon and of the highest part of the mesentery from the base line could be rapidly noted. Moreover, the crural arches and the anterior-superior

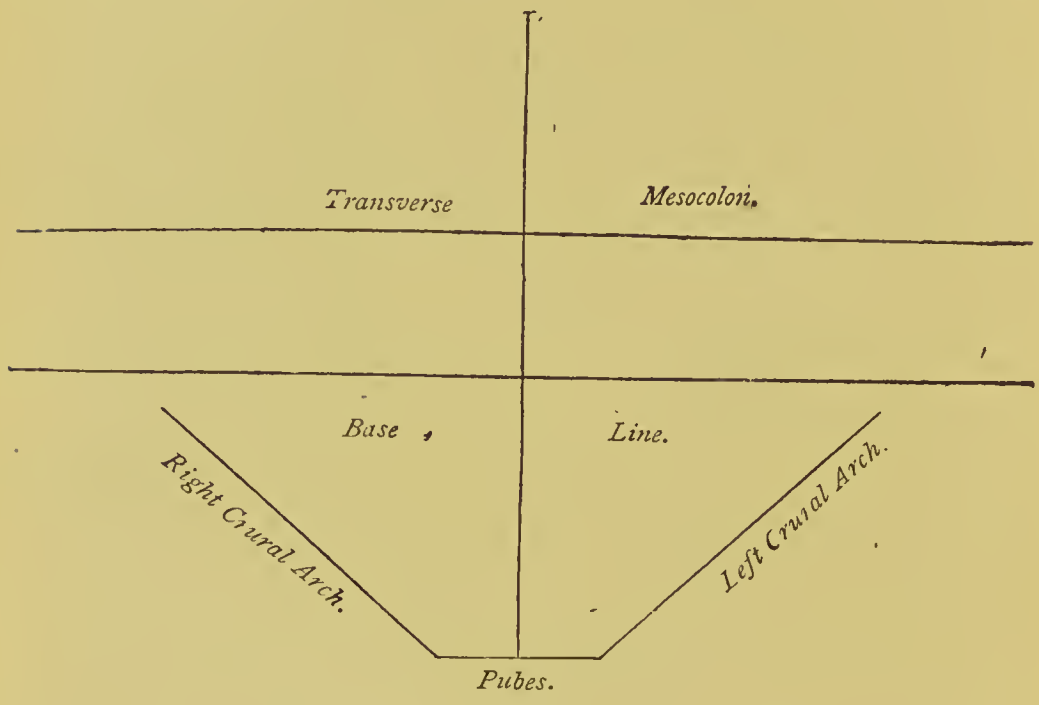


Fig. 2.

Diagram used for recording the Height of the Transverse Mesocolon, and of the Flexura Duodeno-jejunalis and Mesentery, and also the Excursion of the Intestines.

spine of the ilium and the spine of the pubes are given, so that the range of movement of the intestine may be rapidly filled in.

The sequel will, I think, show that no autopsy upon a case of hernia ought to be considered complete until all of these points, and several others which have not yet been mentioned, have been systematically recorded, and I venture to suggest for the purpose

the adoption of some such definite scheme as that which has been mentioned.

The height of the mesentery was taken by measuring the distance of the highest convexity of the flexura duodeno-jejunalis from the base line. This point may coincide with the posterior attachment of the transverse mesocolon, but not infrequently it lies a little below it, and is united to it by a peritoneal fold, the length of which varies, and which, when it exists, contains the vessels and nerves of the mesentery, together with a part of the suspensory muscle of the duodenum and mesentery, a structure which I propose to describe presently.

Although my attention has been directed to this branch of the pathology of hernia for some years, the amount of suitable material which has been collected is not as ample as could be wished. One hundred subjects, whose ages ranged from three weeks to eighty-nine years, have been measured and examined to form a standard of comparison. Thirty-four subjects who had herniæ or hernial pouches are also available to exemplify the length of the mesentery, the height of the mesentery, and the excursion of the intestines; but these include but a tithe of all the cases examined, because the earlier ones, from want of a systematic scheme of measurement, were useless for the purposes of these lectures. However, the results have been so uniform and so striking that it seems justifiable to draw conclusions from them.

The cases which I have examined and measured may be arranged under the following headings: 1. Those in which there were no pouches or protrusions of the peritoneum, and in which there was no obvious fault in the anatomy of the abdomen. These have been tabulated to form a standard of comparison. 2. Those in which there were unquestionable congenital hernial pouches. 3. Those in which there were acquired hernial pouches. 4. Those in which the nature of the herniæ was doubtful. 5. Other conditions bearing upon the pathology of hernia.

I am obliged to speak of hernial sacs rather than of herniæ, because, as is well known, and as may be gathered from Cloquet's works, hernial sacs are usually empty after death, and therefore their contents can rarely be stated.

So far as concerns the peritoneum, mesentery, and suspensory apparatus, the cases of congenital hernia afford little variety, and will be given together. The acquired herniæ, on the other hand, vary exceedingly and have many complications, and therefore they will be placed in groups according to the point in the pathology of hernia which they illustrate.

The Length of the Mesentery.

Anatomical writers often fail to give the length of the mesentery, but our text-book, Quain,* has it that "at its widest part the length of the mesentery is from four to six inches, between its vertebral and its intestinal border." Gray's "Anatomy" † gives six inches, and Tillaux ‡ from twelve to fifteen centimetres; and Treves § puts it at as much as eight or nine inches; so that opinions vary a good deal, and it is clear that more information is needed upon several points. For instance, the relation of the length of the mesentery to the age and stature of the individual is not mentioned, and yet they, especially the first, are of high importance.

Although the hundred cases are all fully tabulated at the end of these lectures, yet, to save trouble, a number of schemes have been constructed from them. The first of these schemes (fig. 3) is given on the next page, and shows in graphic form the greatest length of the mesentery in each instance, together with the age and height of the individual. It shows that the mesentery is longest in infancy, and before the second year is a fifth of the length of the body; but it rapidly decreases, and by the tenth year its proportion is only one-seventh the length of the body; by the twentieth year, an eighth; by the thirtieth, almost a ninth; and by the fortieth, quite a ninth; and this proportion it maintains until the close of life. The widest fluctuations are met with, and in three people aged forty-three it was five inches, seven inches, and ten inches long. The last was an

* Quain's "Elements of Anatomy," 9th edit., vol. ii., p. 610.
† Gray's "Anatomy," 11th edit., 1887, p. 795.
‡ "Traité d'Anatomie Topographique," Paris, 1877, p. 786.
§ "The Anatomy of the Intestinal Canal," p. 26.

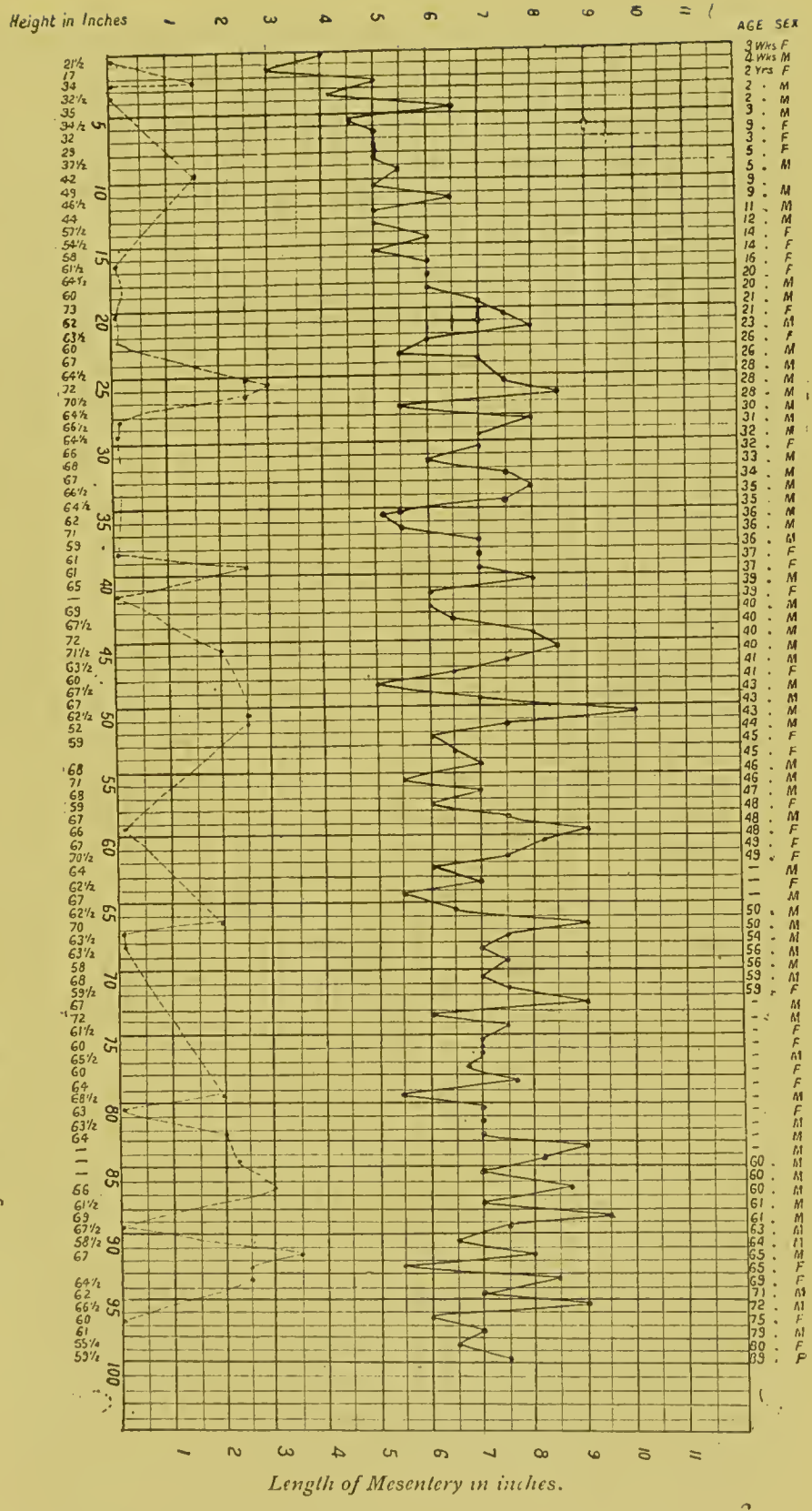


Fig. 3.—Scheme made from one hundred Measurements of Subjects without Hernia, to show the Length of the Mesentery at the Various Periods of Life. The Length of the Lower End of the Mesentery is given in some instances, and is shown by the dotted lines.

exceptional case, but nine inches is not uncommon, and occurred in six per cent. of the cases. Seven and a half inches is about the average length of the mesentery, and it is to be remembered that the width of the intestine is always included.

The length of the mesentery has a most irregular relation to the height of the body, and I have arrived at the conclusion that it is longest in those who have protuberant abdomens. This is especially evident in the case of infants and children.

The length of the lower end of the mesentery was noted in thirty-two instances, and in half of them it merely held the ilium close against the psoas; in the others its length, including the width of the intestines, varied between an inch and a half and three and a half inches.

The Shape of the Mesentery.

Although the shape of the mesentery is seldom mentioned by authors, yet it has to be taken into consideration in making measurements, and in ascertaining the range of movement of the intestines, or in estimating the liability of particular parts of the intestine to protrude.

The ordinary type of mesentery is long in the middle, but dwindles at either end, until it holds the beginning of the jejunum or the end of the ilium close against the posterior wall of the abdomen. Such a mesentery as this might be represented diagramatically by a simple crescentic figure (fig. 4, p. 19).

The other type of mesentery is liable to considerable variation. In it the middle part is the widest, and its jejunal end is short and holds that part of the small intestine close against the spine; its lower end, however, instead of being short, allows the end of the ilium a greater or less range of movement. The shape of this type of mesentery might be represented as in the accompanying diagram (fig. 5, p. 20).

The second type of mesentery owes its peculiarities to the retention of what was originally the fœtal arrangement. It is clear that the first type would tend to keep the end of the ilium out of hernial sacs, inguinal or femoral; whilst the second type seems alculated to facilitate its escape from the abdomen, unless the

attachments of the lower part of the mesentery were so high as to do away with such a possibility. In some of my earlier measurements I did not see the importance of ascertaining the attachment and length of the lower end of the mesentery, but afterwards this omission was repaired. There is also another circumstance which makes this important. When I speak of prolapse of the mesentery the question will arise whether the whole of the attachment of the mesentery gives way, or only its upper part. The answer to this question will also be found to bear upon the relative preponde-

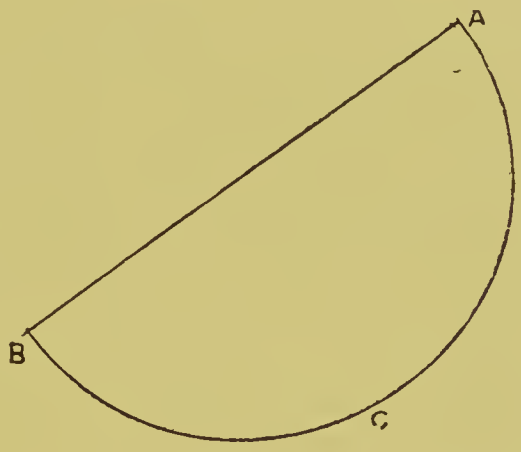


Fig. 4.

A and B, Beginning and End of the Attachment of the Mesentery. C, Intestinal Edge—of course, much shorter than natural.

rance of right and of left ruptures in cases of prolapse of the mesentery.

Elongation of the Mesentery.

Elongation of the mesentery may be real or apparent. I do not propose to include under the term "apparent lengthening" those cases in which, owing to a giving way of its attachments, the mesentery might seem to be elongated. This question will be discussed later; but, doubtless, the non-appreciation of the fact that the attachments and supports of the mesentery may give way and permit it to become prolapsed has hitherto been a fruitful source of error. As an instance of apparent elongation may be

mentioned the case which is afterwards described, to show that when the lower attachments of the mesentery are absent its suspensory muscle and tissues at its root suffice for its support (figs. 9 and 10). Had the mesentery in that instance been casually lifted up and measured, its length would have been deemed excessive. This is, perhaps, an exaggerated example of an abnormal attachment of the mesentery causing apparent elongation, but minor degrees are met with, such as the following:—

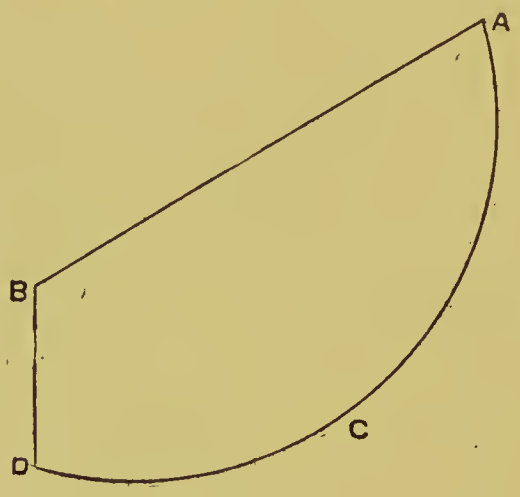


Fig. 5.

A B, Beginning and End of the Attachment of the Mesentery. C, Free Border—of course too short. B D, Width from Attachment to End of Ilium, also free as regards movement.

Apparent Lengthening of the Mesentery.

This case is enumerated in the tables, and illustrates not only apparent elongation of the mesentery, but also that a perfectly normal suspension of the abdominal viscera is not incompatible with extreme old age. The subject was a female eighty years old, and four feet seven and a quarter inches high, and very thin and wiry-looking. Both the mesentery and transverse mesocolon were attached three inches above the base line, but the whole of the mesentery was on the right of the vertebral column; it began at the disc between the econd and third lumbar vertebræ, and

ended three and a half inches above the right crural arch. Measured from its attachment to the right side of the body of the third lumbar vertebra, the length of the mesentery was eight inches, but measured from the usual place in front of the aorta it was only six and a half, and it was three and a half inches long at its end. The downward range of movement of the intestines was very limited; the cæcum touched the anterior-superior spine of the ilium; the small intestine just touched the right crural arch, the pubes, and the left crural arch. The colons were normal, with, perhaps, the exception of the transverse, which lay in contact with the pubes and had a mesocolon seven inches long. The great omentum was very delicate, and extended an inch beyond the pubes. The right colon and the sigmoid flexure had each a short mesentery (half an inch long). The hypogastric folds were prominent, and there was a canal of Nuck a quarter of an inch deep on either side. The other abdominal organs seemed perfectly normal, although the chest was constricted as if by tight lacing.

Thus the apparent length of this mesentery was rather considerable, and might easily have been thought to betoken the general lengthening, which is not uncommon after forty years of age; but the ordinary measurement prevented any error in this respect, and the exceedingly restricted downward range of the intestines seems to confirm the observation. Although the small intestines were so well supported that their protrusion seemed impossible, nevertheless the transverse colon lay so low in the abdomen that it might still have been a source of trouble.

Real Elongation of the Mesentery.

Although the length of the mesentery is exceedingly variable at all periods of life, yet before the age of forty few attain a greater length than eight inches (fig. 3). Out of forty-six instances before the age of forty, only two measured eight and a half inches, whilst five measured eight inches. After forty, however, although short mesenteries are common, many reach larger dimensions. Amongst the remaining fifty-four cases one had a mesentery ten inches

long, and six others had mesenteries nine inches long. The ten-inch mesentery occurred in a woman (case 51, fig. 3), and was associated with a most protuberant abdomen, and as I have said before, the two conditions seem often to be associated.

In all of these cases the elongation of the mesentery was general and involved each part of the serous fold, but presently I shall describe a case in which there was a local elongation of the mesentery.

It seems probable that the general elongation of the mesentery which has just been mentioned may originate in two ways: some may be *congenitally long*, owing to the growth of the mesentery continuing to keep pace with the growth of the body; in others the elongation may be *acquired* and be due to the various causes which bring about relaxation and elongation of the tissues; and thus the lengthened mesentery and relaxed abdominal wall would owe their origin to similar causes.

Local Elongation of the Mesentery.

In the preceding cases there was a general elongation of the mesentery unassociated with hernial sacs or protrusions. Without prejudging the question whether hernia is or is not due to elongation of the mesentery, I propose to describe a case in which there was a very considerable local elongation of the mesentery. In this instance there was a large hernial sac, nearly six inches deep, and containing five feet of ilium. The mesentery of this portion of gut was eleven inches long, but the rest of the mesentery was of the ordinary length, namely, seven and a half inches. Such cases as this are, perhaps, rare, and it is the only one of the kind which I myself have seen. However, the whole history of the case seemed to show that the elongation was an effect, not a cause, of the hernia.

Case of Oblique Inguinal Enterocele of the Right Side (? Funicular), with Local Elongation of the Mesentery.

Amongst the cases without hernia which I have given (*vide* fig. 3, p. 17) are some in which the mesentery was nine and even ten inches long, but in the following instance, which was one of hernia,

a part of the mesentery measured eleven inches, including the width of the intestine, and this is the longest I have met with. The subject was a man aged eighty-five years, and five feet six inches high, strong and muscular. He had a scrotal hernia of the right side which was nearly six inches long, measured from the external ring. It is known that his hernia had given little trouble, and that for some years he had not worn a truss. Five feet of the ilium lay in the sac, and its distal end was six inches from the cæcum. The mesentery of the herniated gut was rope-like and very taut, and, as I have said, measured eleven inches;

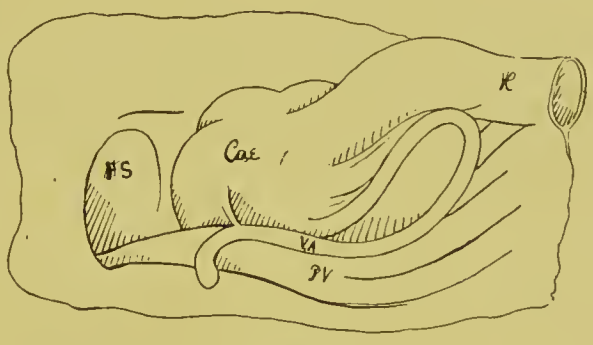


Fig. 6.

To show the fold (Plica Vascularis) which in the accompanying case of local elongation of the mesentery ran upwards from the sac to the vermiform appendix and ilium. This specimen will be referred to again in speaking of hernia of the vermiform appendix. *Cae.*, Cæcum. *Il.*, Ilium. *M.S.*, Mouth of Hernial Sac. *P.V.*, Plica Vascularis. *V.A.*, Vermiform Appendix.

and it allowed the intestines to reach the bottom of the sac; the length of the rest of the mesentery, measured in the usual way, was seven and a half inches, the length of the lower end, *i.e.*, that next the cæcum, three and a half inches, and this part was attached three and a half inches above the right crural arch. The transverse mesocolon was three inches, and the flexura duodeno-jejunal is two and a quarter inches, above the base line. The cæcum lay almost in contact with the right crural arch, the hepatic flexure of the colon was opposite the end of the twelfth rib, the splenic opposite the seventh intercostal space, and the sigmoid flexure,

which had no mesentery, crossed the psoas an inch and a half above the left crural arch. The transverse mesocolon was four inches long, and the great omentum six and a half inches long. The kidneys were not prolapsed.

The hernial sac did not contain the testicle, and the spermatic vessels and vas deferens were closely related to its hinder wall. Its mouth was capacious, and a fold, an inch and a quarter in width, ran upwards through it from the back of the sac towards the mesentery. This fold was, I have no doubt, a persistent plica vascularis, and the vermiform appendix ran along its free edge (*vide* fig. 6). From the presence of this plica, and from the close relations of the spermatic vessels and vas deferens to the sac, we may infer that the sac had a congenital origin, and the relation of the appendix to the fold is important, because it helps to explain how that structure became herniated in a case which I shall describe in the second lecture.

The Suspensory Muscle of the Duodenum and Mesentery.

The suspension of the mesentery has hardly received the attention it deserves. As long since as 1853 Treitz* described that which he called the suspensory muscle of the duodenum, but our works on anatomy have taken hardly any notice of his discovery, and I am not aware that any pathologist has recognised its importance. The authors of Quain's Anatomy† say that the termination of the duodenum "is maintained in its position by a strong fibrous band descending from the left crus of the diaphragm and the tissue around the cœliac axis." They then remark that "according to Treitz, plain muscular fibres come from both these sources to this part of the duodenum." Cruveilhier‡ goes further, and writes that the duodenum "is solidly fixed in position by the peritoneum, by the mesenteric vessels and nerves, and by the pancreas, to which it is united by muscular fibres which

* "Ueber einen neuen Muskel am Duodenum des Menschen," Treitz, *Vierteljahrschrift für die Praktische Heilkunde*, Prag., 1853, p. 113 *et s.*

† Quain's "Elements of Anatomy," 9th edition, 1882, p. 610.

‡ "Traité d'Anatomie Descriptive," 1874, vol. ii., p. 132.

penetrate between the acini of the gland, and finally by the suspensory muscle of the duodenum (Treitz)." This

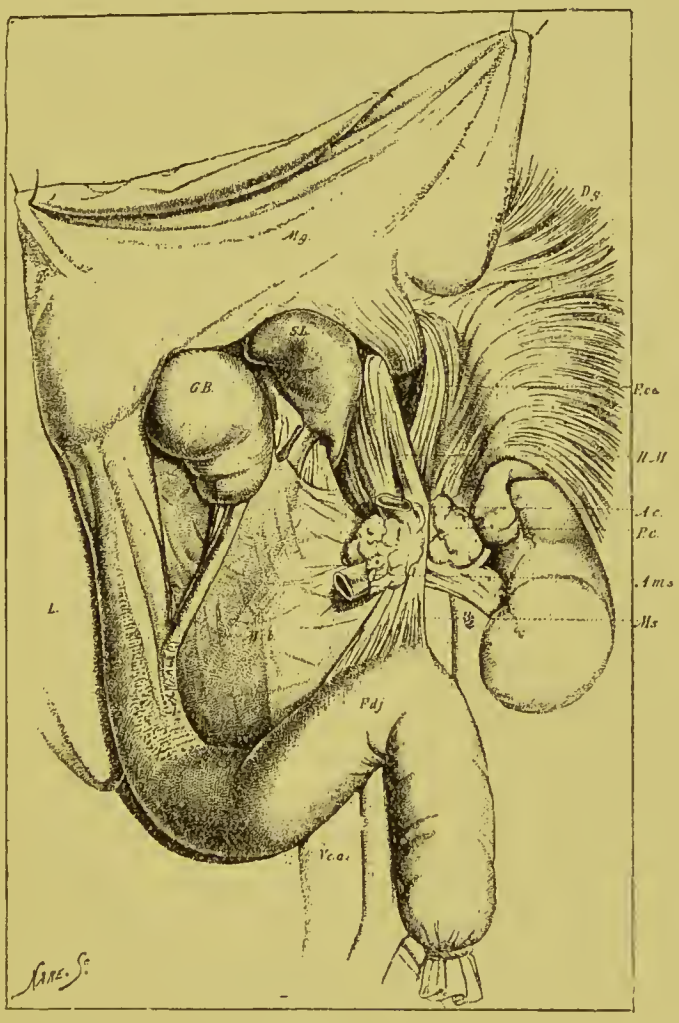


Fig. 7.

Suspensory Muscle of the Duodenum (Treitz). *A.c.*, Cæliac Axis *A.m.s.*, Superior Mesenteric Artery. *F.d.j.*, Flexura Duodeno-jejunalis. *F.oe.*, Foramen Œsophageum. *G.B.*, Gall Bladder. *M.b.*, Fascial Layer. *M.s.*, Suspensory Muscle of Duodenum. *P.c.*, Solar Plexus. *M.g.*, Stomach. *V.c.a.*, Vena Cava Inferior.

topic is also mentioned by such anatomists as Henle, Krause, and Sappey, but with no further addition to our know-

ledge. The description which Treitz himself gives of this muscle is very clear, and is, without doubt, the source whence Cruveilhier obtained his information; however, as we shall see presently,

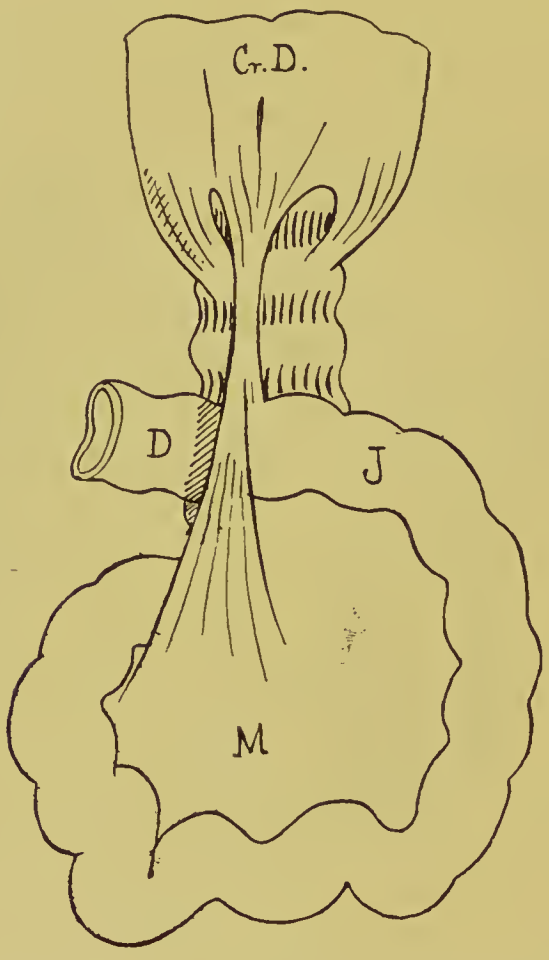


Fig. 8.

The Suspensory Muscle of the Duodenum and Mesentery of a Child. Cr.D., Crura of Diaphragm. D., Duodenum. J., Jejunum. M., Mesentery.

Treitz's description is wanting in important particulars. According to Treitz,* the fibres of the suspensory muscle of the duodenum spring from the band which forms the right side of the

* *Loc. cit.*, p. 114.

foramen œsophageum, and runs downwards by the left side of the cœliac axis, over the solar plexus, to the superior mesenteric artery, and to its insertion into the flexura duodeno-jejunalis, and into the pars transversa inferior (*vide* fig. 7). The dissections which I have made clearly prove the correctness of these statements, and they also show that the fibres, besides being inserted into the duodenum, run onwards with the superior mesenteric artery into the mesentery. In this way they assist in its suspension, and the muscle ought, I venture to suggest, to be called the suspensory muscle of the duodenum and mesentery, a term which would more clearly indicate the function it performs. In the drawing which accompanies Treitz's essay (fig. 7) the muscle conforms to his description, and the mesenteric continuation is not delineated. The accompanying figure (fig. 8) was made from a specimen obtained from a child of five years of age. At this time of life the muscle is very easy to recognise and dissect, but as age advances the fibres become so intermingled with the solar plexus and pancreas, and with the arteries, lacteals, and veins at the root of the mesentery, that its dissection becomes difficult. Moreover, as age advances its muscular structure becomes less apparent, and it becomes tendinous, and acquires the naked-eye characters of fibrous tissue. Together with the other constituents of the root of the mesentery, it forms a band of considerable strength, sufficient not only to support the weight of the intestines and mesentery, but also to resist the pressure of the descent of the diaphragm. Later it will be seen that in some varieties of acquired hernia it loses these properties, and becomes long, thin, and extensible.

Weight Borne by the Suspensory Apparatus of the Mesentery.

The actual weight borne by the suspensory muscle and tissues at the root of the mesentery is comparatively small. In twenty-three subjects, whose ages ranged from three years up to seventy-two, the average weight of the mesentery and of the small intestines, and any contents they happened

to have, was twenty-six ounces. The number of subjects which were available for this calculation was, for reasons which need not be mentioned, very small, but they tend to show that the maximum weight may be attained by the age of thirty-five, after which it varies considerably, but does not fall below the average until old age commences. I suspect that the weight depends very much upon that of the individual, and also upon the amount which the intestines may contain. Thus the actual weight which the suspensory muscle of the mesentery and the tissues at the root of the mesentery have to bear is hardly sufficient, one would imagine, either to put much strain upon them or to cause their elongation. But, without doubt, those structures have another function, and are called upon to resist the pressure which the diaphragm obviously exercises upon the intestines when it descends during inspiration. I am not acquainted with any experiments to show how much pressure the suspensory apparatus has to resist under those circumstances, but it may be assumed that it is something considerable, and worthy of being taken into consideration.

It is interesting to note that the viscera, which are particularly liable to be displaced by the descent of the diaphragm, especially the stomach, liver, and spleen, are fastened to it by appropriate ligaments, so that after having been depressed they are returned to their proper stations. It seems reasonable to suppose that some such principle underlies the connection which the suspensory muscle of the mesentery has with the muscular substance of the diaphragm.

Although the weight of the large intestines has no particular bearing upon the present question, yet it may be mentioned that it was ascertained in eighteen instances, and the average weight was twenty and a half ounces. Here, again, the ages of the subjects ranged from three to seventy-two years, but it was obvious that the variable nature of the contents of the bowels was a grave source of fallacy. The weight which has just been given included that of the transverse mesocolon, great omentum, and sigmoid flexure, as well as that of the rest of the large intestines and their contents.

The Suspensory Muscle and Tissues at the Root of the Mesentery are sufficient to uphold the Small Intestines.

That the suspensory muscle and the tissues which form the root of the mesentery can uphold the intestines without the aid of the mesenteric attachment which extends from the duodeno-jejunal flexure to the right iliac fossa is proved by those cases in which the lower attacnments of the mesentery are congenitally absent. The following is an instance of this:—

In the abdomen of a male, supposed to have been fifty years of age, the cæcum was found free in the abdomen and lying to the left of the umbilicus, whilst the small intestines occupied the right iliac fossa and right lumbar region. This was due to the fact that the mesentery and right colon had retained their primitive fœtal arrangement. When the mesentery and intestines were thrown upwards over the thorax it was found that the lower attachments of the mesentery were wanting, and that, in consequence, the peritoneum stretched smoothly over the front of the spine, and over the aorta, psoas muscles, and right lumbar region (fig. 9). The sigmoid flexure, left colon, and splenic flexure were arranged as usual, but the rest of the colon and the cæcum were supported by the mesentery, which was common to them and to the small intestines. The root of this common mesentery was strongly upheld three and a half inches above the base line; its length, measured from the duodeno-jejunal flexure, was nine and a half inches, but, of course, this must not be compared with the ordinary standard, having been ascertained in a different manner. This mesentery permitted the following downward range of movement to the intestines: the ilium reached two inches beyond the right crural arch, and one inch beyond the left, whilst the cæcum easily passed three inches beyond the right crural arch. Although of no immediate importance, I may add that the sigmoid flexure had a mesentery three inches long, and attached to the brim of the pelvis four and a half inches from the left crural arch. The cause of this congenital abnormality was a quantity of strong adhesions, which bound the

stomach, jejunum, and mesentery to the under surface of the diaphragm and to the liver (fig. 10, p. 33). It seems highly probable, as I have endeavoured to show elsewhere,* that these had been caused by an attack of intra-uterine peritonitis. It might be argued that these adhesions might have enabled the suspensory muscle and tissues at the root of the mesentery to bear a strain which might otherwise have caused prolapse. However, cases have been met with in which a smaller degree of the same abnormality was present, and in which there were no adhesions and no prolapse. I need hardly mention that in the above instance there was no hernia, although the hypogastric fossæ were very slightly bulged.

This particular body had been used for operative surgery, and, as might be expected, no colon was found in the right loin, and the jejunum had been dragged into the wound.

The Height of the Mesentery.

The mesentery is usually said to extend from the left side of the body of the second lumbar vertebra to the right sacro-iliac articulation. These attachments are given by Henle,† Krause,‡ and other authors, and are generally accepted, with the exception, perhaps, of Mr. John Wood, who, as we have already seen, is of opinion that the height varies; in a little while I propose to inquire whether this is so or not. Before doing this it may be remarked that it is not convenient for clinical purposes to know that the highest part of the mesentery is at the left side of the body of the second lumbar vertebra, and therefore I will give the results of measurements made in the way described in the earlier part of this lecture, namely, by measuring the distance of the flexura duodeno-jejunalis from a base line made by stretching a string across the body on a level with the top of the iliac crests.

* "Abnormalities of the Cæcum and Colon, with reference to Development," *British Medical Journal*, vol. ii., 1882, p. 574; also "Abnormality of the Colon a Cause of Unsuccessful Colotomy," St. Bartholomew's Hospital Reports, vol. xix.

† "Handbuch der Eingeweidelehre des Menschen," 1873, p. 895.

‡ Krause, "Specielle und Macroscopische Anatomie," 1879, p. 453.

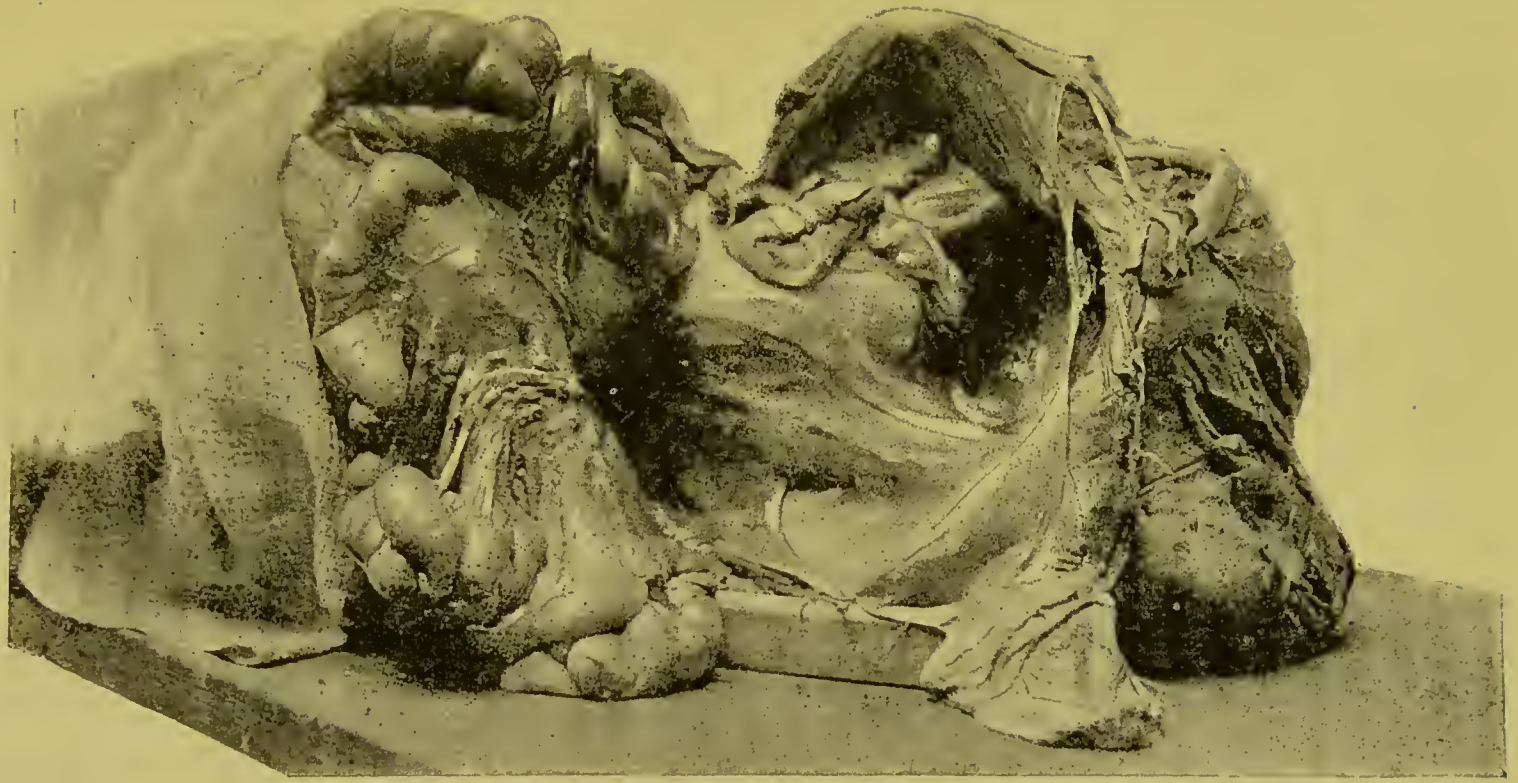


Fig. 9.

Showing the Absence of the Lower Attachments of the Mesentery. The Cæcum, Colon, and Small Intestines suspended by a common Mesentery. From a photograph by Mr. W. McA. Eccles.

As this line usually passes through the umbilicus, a ready and rapid estimate can easily be made in examining the living subject.

The flexura duodeno-jejunalis was chosen for estimating the height of the mesentery, because it receives the main attachment of the suspensory muscle, and because experience shows that when the supports of the mesentery fail it affords an easy and obvious means of learning the amount of prolapse. In infants the distance, or height, of the flexura duodeno-jejunalis from the base line varies between one and two inches, and in children up to the tenth year its height varies between two and three inches (fig. 12, p. 37). The distance gradually increases with the age and stature of the individual, and from puberty until forty is between three and four inches. In thirty-two cases whose ages ranged from fourteen to forty only two had duodeno-jejunal flexures less than three inches high, and in them the height was two and a half inches (fig. 12, case 28 and 35). Of course it is possible that some cause existed to account for these, but whatever it might be, it was not of an obvious nature.

Before discussing the height of the duodeno-jejunal flexure in older subjects, its height in the infants and children calls for mention. In proportion to their stature it is clearly large compared with the height in adults. However, I am inclined to think that the method of measurement is mainly responsible for this. In infancy and childhood, as is well known, the pelvis is small and undeveloped, and therefore the highest point of their iliac crests would be farther away from the upper lumbar vertebræ, against which the duodeno-jejunal flexure rests. This line of argument receives some support from the circumstance that in female subjects the average height of the flexure is rather less than in males; as might be expected, when the size of their pelvis is taken into consideration; but, of course, their stature is much less, and the diminution is perhaps sufficient to account for the trivial difference in the measurements.

After forty years of age the flexura duodeno-jejunalis is more often found at a lower level, and in fifty-four cases whose ages ranged from forty-one to eighty-nine, in thirty-three the flexura duodeno-jejunalis was between three and four inches above the

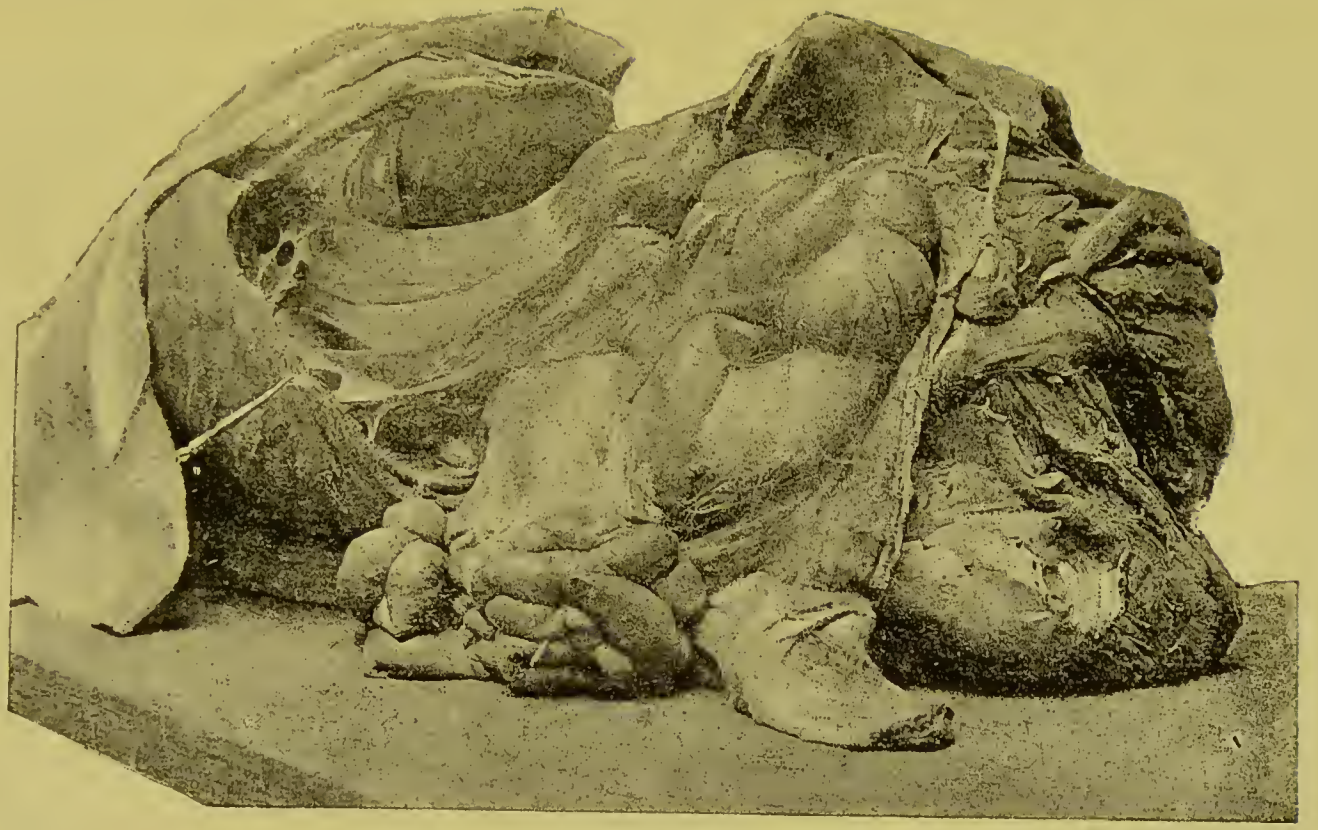


Fig. 10.

From same abdomen as Fig. 6. To show the Adhesions supposed to have prevented the proper development of the Mesentery. From a photograph by Mr. R. H. Elliott.

base line, and in five others four and a half, and in one five inches above the base line (fig. 12, case 63). But low suspension was more frequent in this class, and in six cases the flexura was two and a half inches, and in four two inches, above the base line. One old man of seventy-two had the flexura on a level with the base line, but the peritoneum in the region of his femoral rings and of his hypogastric fossæ was beginning to bulge. This case will be mentioned again in speaking of prolapse of the mesentery.

The height of the mesentery has been so little studied that little is known about its variability, and perhaps those cases in which it fell below three inches will ultimately be classed as instances of prolapse.

Height of the Lower Attachment of the Mesentery.

I was not at first aware of the importance of ascertaining the height of the lower attachment of the mesentery. But when the pathology of acquired hernia is discussed, it will be seen that knowledge is greatly needed upon this point. Anatomists usually say that the mesentery ends at the right sacro-iliac synchondrosis, but this expression is not very precise or very suitable for practical purposes. In forty-two subjects (fig. 11, p. 35), whose ages ranged from two to eighty years, the distance of the attachment of the end of the mesentery from the centre of the right crural arch was measured, the rule being held parallel to the psoas muscle. In children under sixteen years of age the average height was a little over three inches, whilst from sixteen to eighty the average was four inches. In one case it lay as low as two and a half inches from the crural arch, but the flexura duodeno-jejunalis was also lower than usual, being only two and a half inches above the base line. In four of the forty-two instances the lower attachment of the mesentery was only three inches above the centre of the right crural arch, and in four it was five inches above, one of the latter being five and a half inches. It is probably safe to assume that when the lower attachment of the mesentery is less than two and a half inches from the crural arch it has either been pulled down or has prolapsed.

The Excursion of the Intestines.

It is quite exceptional to meet with cases in which the mesentery is so short, and its attachment so high, as to prevent the escape of the intestines from the abdomen. In twelve per cent. of the measurements their excursion was limited to such a degree that the small intestines just touched the lower abdominal walls, and could not have been drawn from the abdomen without stretching or displacing the mesentery (*vide* fig. 12, p. 37). But even under

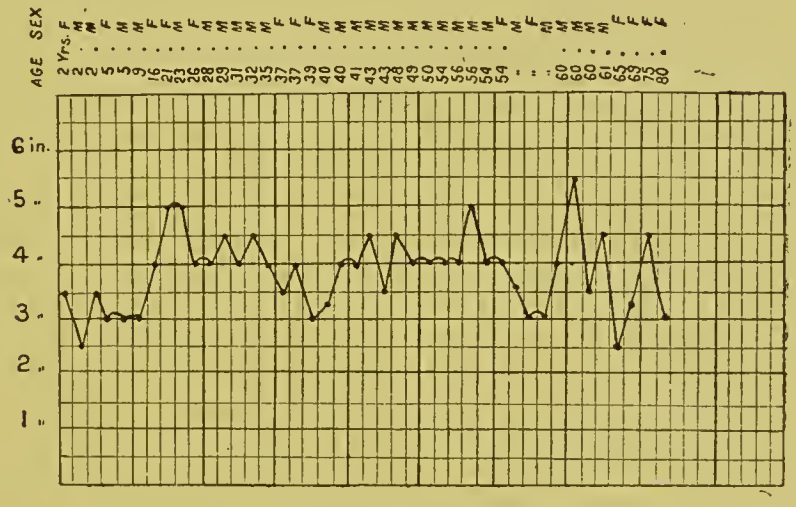


Fig. 11.

Scheme showing the Distance of the Lower Attachment of the Mesentery from the Middle of the Right Crural Arch. Made from forty-two cases of various ages.

such circumstances as these the intestine may become engaged in the internal abdominal ring, and actually be the cause of the patient's death. This happened in one of the cases of congenital hernia which will be described in the next lecture, and in which the herniated intestine could just be drawn as far as the pubic spine, and the history of the case states that the hernia was a small bubonocele. Indeed, so far as my observations have gone, they lead me to think that, as concerns the excur-

sion of the intestines, no one is exempt from the possibility of hernia.

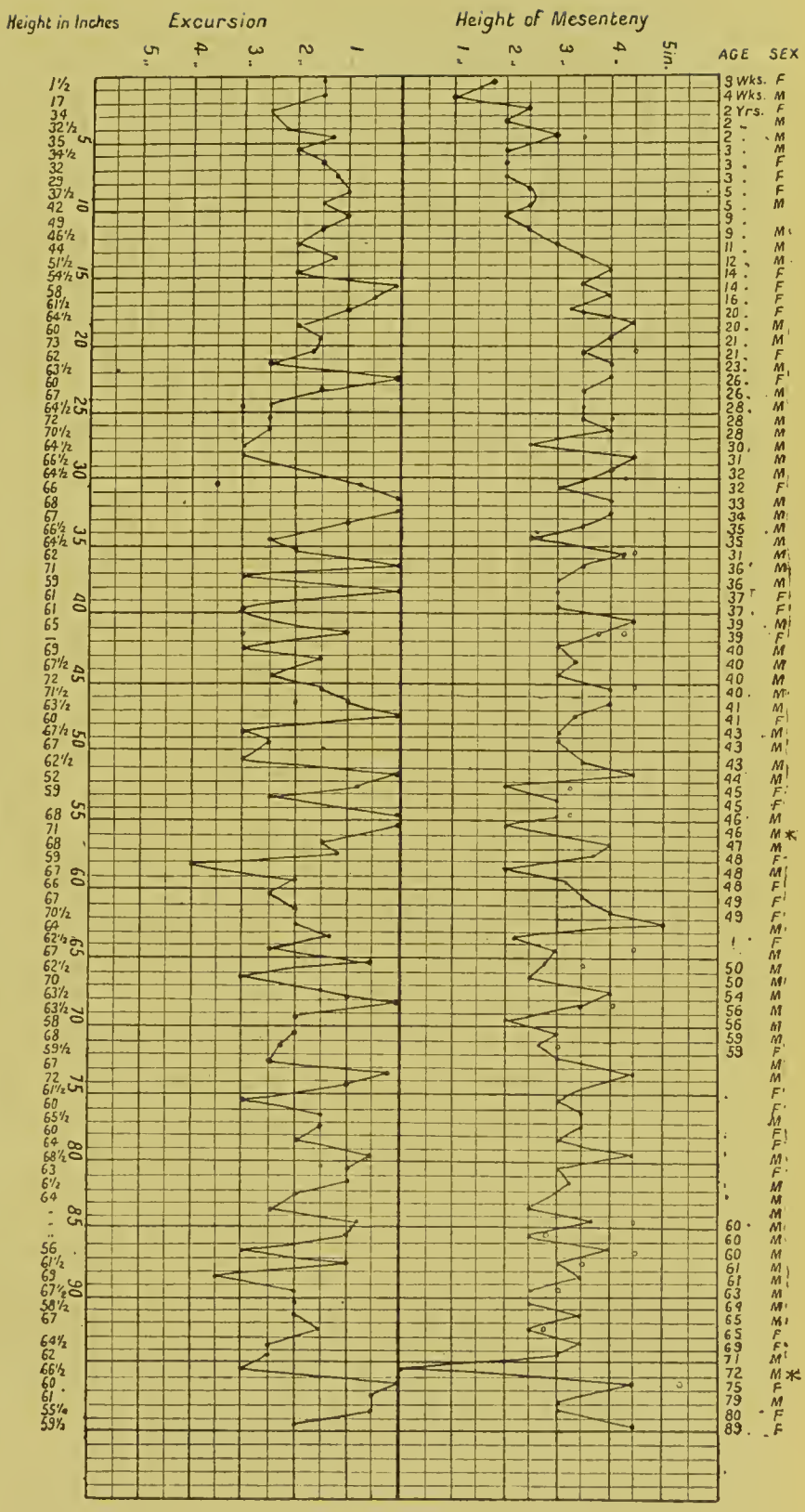
Although the excursion of the ilium exceeds that of other parts of the alimentary canal, yet it sometimes happens that other portions, especially the cæcum, possess a greater range of movement. However, only seven of the hundred subjects without hernia had very displaceable cæca, and in them that portion of the canal exceeded the excursion of the ilium by an inch and a half, two and three-quarter inches, two inches, thrice by an inch, and once by three inches (*vide* fig. 12). The last case was that of a man sixty-five years of age (case 92, fig. 12), whose ilium passed two inches beyond the right crural arch, and the cæcum five inches beyond the same landmark; this was the greatest downward excursion met with in any case, but it was unaccompanied with hernia or any peculiarity of the attachments of the gut itself.

If now we proceed to analyse the cases we shall find, as might be expected from what has gone before, that the long mesentery of infancy and childhood is associated with a considerable downward excursion of the small intestines. Before the age of fourteen the ilium reaches from one to two inches beyond the right crural arch, a rather shorter distance beyond the spine of the pubes, and a yet shorter distance beyond the left crural arch. When the stature of the subjects at the various ages is taken into consideration, it is clear that the excessive excursion of infancy and childhood tends to diminish with adolescence. In seventy-two individuals whose ages ranged from sixteen to eighty-nine years the excursion of the intestines over the centre of the right crural arch, where it is almost always the greatest, varied between three inches and nothing, the large excursion being noted in eleven instances, and the small in twelve (*vide* fig. 12). In one other case (case 59) the excursion was four inches, but this was associated with a low attachment of the mesentery, namely, two inches above the base line; and in yet another case (case 89) the excursion was three and a half inches, the flexura duodeno-jejunalis being three and a half inches above the base line, and the mesentery nine and a half inches long. Of course, the above only gives the greatest excursion of the intestines over the centre of the right crural arch, but, with hardly any excep-

Fig. 12.

Scheme to show the Height of the Flexura Duodeno-jejunalis and the Excursion of the Intestines in 100 Subjects without Hernia.

Case 56 (marked with *), mesentery was five and a half inches long, and the transverse mesocolon was five and a half inches above the base line. Case 96 (marked with *) will be described separately as a case of prolapse of the mesentery without hernia. There was bulging of the hypogastric fossæ in cases 66, 70, 71, 72, 87, 90, 94, and 96. The excursion of the cæcum over the right crural arch exceeded that of the small intestine in the following cases, which are enumerated together with the excursion of the cæcum: Case 25, 3 in.; 31, 3½ in.; 42, 3 in.; 47, 2 in.; 62, 3 in.; 81, 1½ in.; and case 92, in which it was 5 in.



tions, the excursion is less over the spines of the pubes and the left crural arch. It is quite usual to find in adults that the small intestines will pass an inch and a half beyond the right crural arch, an inch beyond the spine of the pubes, and that it will just touch the left crural arch.

It is an easy way of representing the downward excursion of the intestines in the adult by fixing a piece of tape or string, seven and a half inches long, to the abdominal wall at the same level as, but an inch to the right of, the umbilicus. The free end of this string passes about the same distance beyond the crural arches and pubic spines as the intestines ordinarily do.

LECTURE II.

The Hypogastric Fossæ.

IN the course of these lectures it will be shown that the sac of an acquired hernia is a late and extreme manifestation of the morbid state of the abdominal wall. The data at my disposal indicate that before the sac of an acquired hernia is created there is a preliminary bulging of the abdominal walls, especially in the region of the hypogastric fossæ, and therefore I propose, as a preliminary, to mention those fossæ. This is the more called for because they are variable, and the non-recognition of some of their conditions leads to errors and confusion. The hypogastric fossæ have been described so often that a long account of them is quite unnecessary. I propose to mention them under two headings, namely, congenital hypogastric fossæ and acquired hypogastric fossæ.

The congenital hypogastric fossæ are caused by the folds of peritoneum which are raised by the urachus, the obliterated hypogastric arteries, and by the epigastric arteries.

They are depicted in the accompanying drawing (fig. 13) of the front wall of the abdomen seen from behind. The drawing was made from a photograph taken by Mr. C. S. Patterson. The fold of the urachus occupies the middle line, above the urinary bladder, and at each side of it are the sharply defined hypogastric folds, and still farther out and running towards the brim of the pelvis are the folds or ridges caused by the epigastric arteries. For a reason which will be given later the epigastric fold is frequently, as it happens in this instance, only prominent in the right side. These three folds bound the internal, middle, and external hypogastric fossæ. The internal is sometimes called the supra-pubic fossa,* and its base corresponds with the crest of the pubes;

* Tillaux, "Traité d'Anatomie Topographique," Paris, 1877, p. 722, fig. 186.

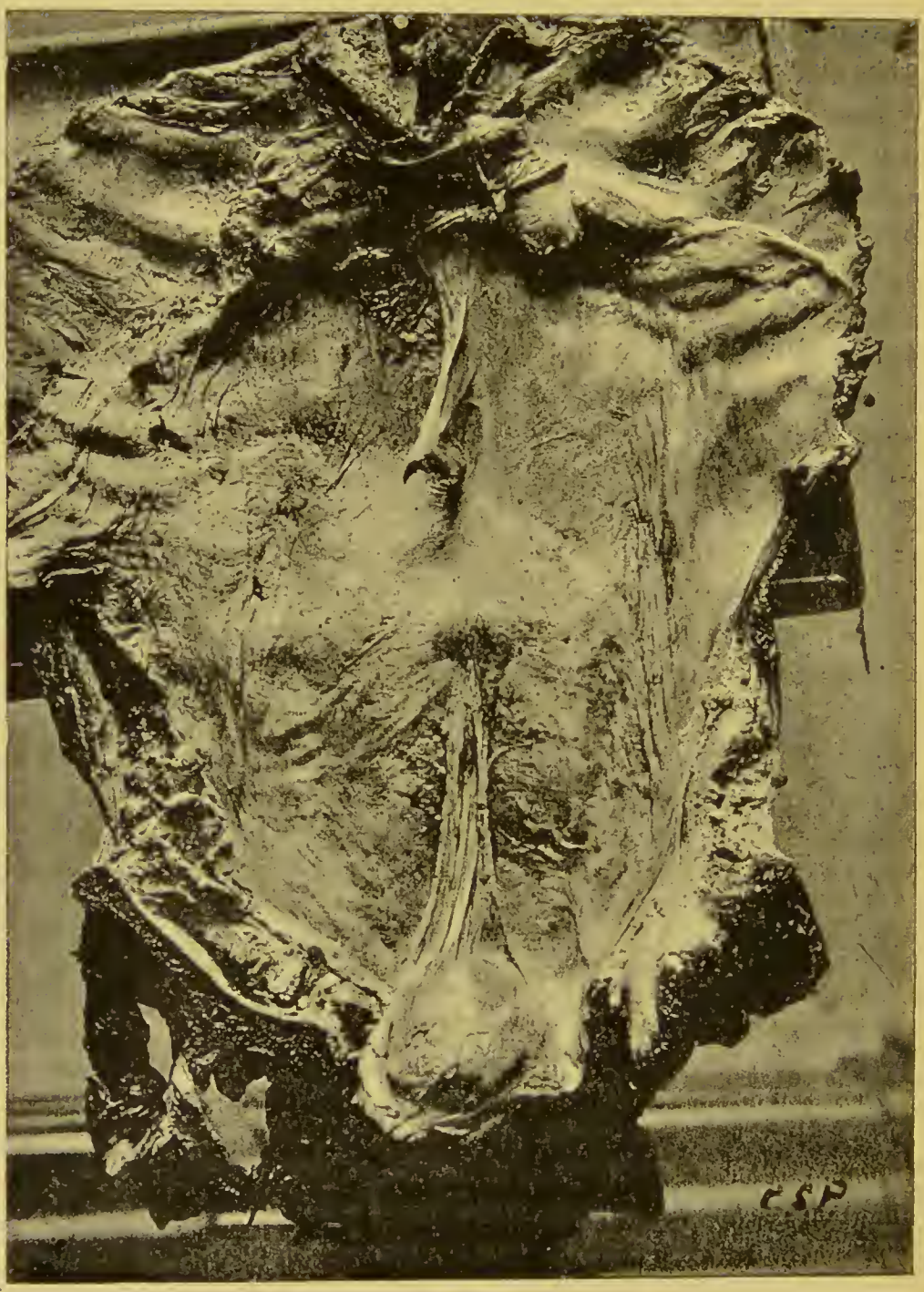


Fig. 13.

The back aspect of the front Abdominal Wall of a Middle-aged Male. On the right side the fold of peritoneum raised by the epigastric artery is conspicuous, owing to slight bulging of the middle and external hypogastric fossæ. From a photograph by Mr. C. S. Patterson.

the middle fossa, the deepest, lies behind the inguinal canal, and also leads towards the femoral ring ; the external fossa, as is well known, leads towards the internal abdominal ring. The relation of these fossæ to different forms of hernia need not be mentioned, and is generally recognised; at present the varying depth of the fossæ is of more importance. The depth of the congenital hypogastric fossæ varies with the degree of prominence of the three peritoneal folds or ridges. When the latter are absent, as they sometimes are, the limits of the fossæ can with difficulty be defined; when the folds are prominent their depth is correspondingly great. However, when the hypogastric folds are very wide they lie flat against the abdominal walls, and do not create such deep fossæ as might be expected.

The acquired hypogastric fossæ correspond in boundaries and position to the congenital fossæ which have just been described, but they owe their depth to a pathological change in the abdominal wall ; that structure, when unable to resist the pressure of the intestines, bulges where it is the least strengthened, namely at the hypogastric fossæ. The hypogastric fossæ of the right side are the first to suffer, and suffer the most severely, but the left do not escape. The specimen which is depicted in the figure (fig. 13) was made from a part of the abdominal wall of a man beyond the middle period of life, and in it the bulging of the hypogastric fossæ of the right side is very marked; indeed, were it not present it is questionable whether the ridge of the epigastric artery would be so prominent. Thus, the hypogastric fossæ may exist under three conditions: first, they may be congenitally deep, owing to prominence of congenital folds ; second, these congenital fossæ may be deepened by a bulging of the abdominal walls ; and third, the congenital folds being hardly discernible, the fossæ may be, as it were, created by the bulging.

In congenital hernia the hypogastric fossæ vary with the prominence of the folds, but there is no bulging of the abdominal wall, and the mouth of the hernia is flush with the rest of the peritoneum (fig. 14, p. 42).

In acquired hernia deepening of the hypogastric fossæ is the rule, and the mouth of the sac, instead of being flush with the

rest of the peritoneum, is approached by the bulging, so that it is more or less funnel-shaped (*vide* fig. 14).

These bulgings of the abdominal wall are, I think, a morbid change antecedent to hernia. In the hundred cases without hernia (fig. 12, p. 37) eight had bulgings of the abdominal, but all of them were over fifty years of age (Nos. 66, 70, 71, 72, 87, 90, 94, and 96). When the cases of acquired hernia are detailed it will be seen that that affection occurs when there is neither elongation nor prolapse of the mesentery, and similarly in these eight cases of bulging, although there was no elongation,

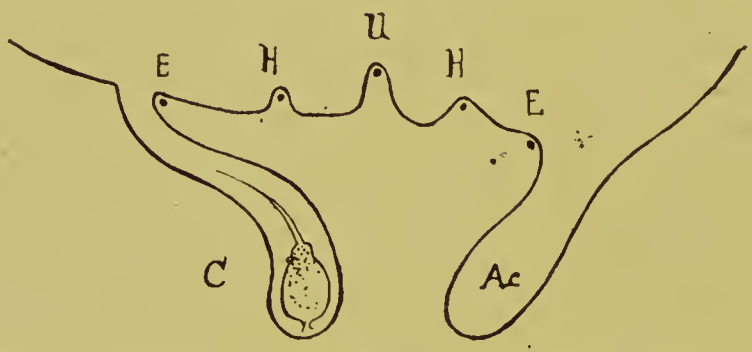


Fig. 14.

Diagram of Hypogastric Fossæ in Congenital and Acquired Hernia. C, Congenital Sac. Ac, Acquired Sac. U, Urachus and its Fold. H, Hypogastric Artery and its Fold. E, Epigastric Artery.

they usually had a low attachment of the mesentery; nevertheless, the latter was far from being an invariable accompaniment. For instance, in them the height of the flexura duodeno-jejunalis was as follows: In one case it was on a level with the base line; in another, two inches above the base line; in another, two and a half inches above the base line; in two cases, two and three-quarter inches above the base line; in two cases it was three inches above the base line; and lastly, in one case the flexura was four inches above the base line. There are two factors which would be likely to diminish the likelihood of a low attachment of the mesentery being always associated with bulging of the hypogastric fossæ, namely, the variability of the length of

the mesentery, and the varying thickness and strength of the abdominal walls.

Hernia of the Right Side.

The greater depth of the right hypogastric fossæ is a fact of some significance, and is explained by a circumstance which was mentioned in the first lecture, namely, the greater excursion which the right segment of the mesentery normally permits to the intestines; and it is probable that this is due more to the way in which the mesentery is attached than to an alteration in its length. Except in subjects with acquired hernia, it is unusual to find that the lower end of the mesentery approaches nearer to the right crural arch than three inches, the rule being laid along the right psoas muscle (see scheme, fig. 11, p. 35). Moreover, this anatomical disposition explains, as others have argued,* the frequency of hernia upon the right side of the body. The accompanying scheme (fig. 15), which has been constructed from the table which Mr. Kingdon gives at the end of his monograph on hernia,† shows that during childhood single right herniæ comprise nearly seventy per cent. of all the cases of inguinal and femoral hernia. However, it must not be supposed that they maintain this supremacy, because in the last lecture it will be shown that causes are at work which ultimately increase and equalise the number of left and double herniæ. This question will be mentioned again in greater detail, but it is convenient to give at once the percentage of right herniæ at the different periods of life (fig. 15).

Congenital Hernia.

The standard of comparison which has been constructed and explained in the previous lecture makes it possible to gauge the length of the mesentery, the height of the mesentery, and the excursion of the intestines in those who have hernial sacs or herniæ. This branch of the pathology of hernia has not, so far as can be ascertained, been properly followed out, and therefore it seems desirable to give in full the details of the various cases.

* "Anatomy of the Parts concerned in Femoral Rupture," Callender, 1863, p. 42.

† *Loc. cit.*, p. 320.

This is the more called for because although the general results seem clear and free from doubt, yet each case has peculiarities, and a knowledge of these is of no small importance in arriving at a final judgment upon the pathology and treatment of the disease.

Considered from the point of view of the length of the mesentery, the height of the mesentery, and the excursion of the intestines, the whole of the cases naturally fall into certain groups, the first of which comprises those in which there were congenital hernial sacs or herniæ. Before detailing this group of cases, it may be convenient to tell briefly what they seem to show, remembering always that they are few in number. In the first place they show

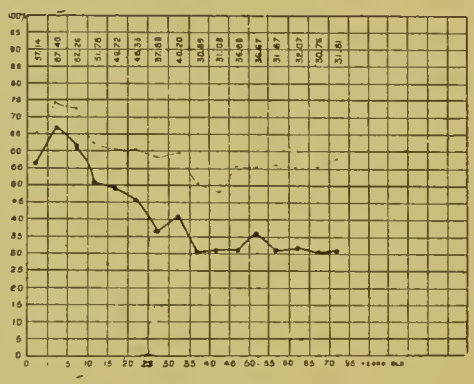


Fig. 15.

Scheme constructed from Mr. Kingdon's tables of over 6,000 cases of Inguinal and Femoral Hernia, to show the percentage of single right Herniæ. The faintly dotted line shows the total percentage of right herniæ at all periods of life.

that the mesentery is not elongated; secondly, that it is suspended at its proper height; and thirdly, that the excursion of the intestines is not increased. But they show in addition that, contrary to what many think, a congenital hernial sac may exist without the bowel protruding, although the mesentery is quite long enough to permit that occurrence; and further, that the intestine may prolapse into a congenital sac, become strangulated, and cause death, although the mesentery hardly permits it the ordinary amount of downward excursion. The cases will be given according to their age, the youngest first.

Cases of Congenital Hernia.

Case I.

Empty Infantile Sac associated with a Considerable Downward Excursion of the Intestine—Aged Ten Weeks.

The following case was under the care of Mr. Harrison Cripps, to whom I am indebted for the use of it. The patient was an

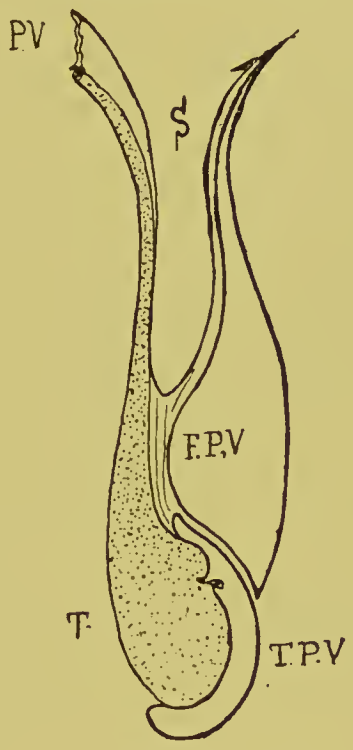


Fig. 16.

Semi-diagramatic Figure of Infantile Hernia—Child, Ten Weeks. F.P.V., Funicular Portion of Processus Vaginalis. T.P.V., Testicular Portion of Processus Vaginalis or Tunica Vaginalis. S., Hernial Sac. P.V., Plica Vascularis. T., Testicle. (See also diagrams of Infantile Hernia, Lecture III.)

infant, ten weeks old, and twenty-three and a half inches high. So far as is known he had never had a hernia, although the length of the mesentery and the presence of an infantile sac predisposed to that affection. The infant had the usual symptoms of acute intestinal obstruction, and what appeared to be a hernial swelling in the right side of the scrotum. When an incision was made

into this swelling a sac, like the sac of an ordinary hydrocele, was first opened (fig. 16), and some clear fluid escaped. There was a slight bulging at the back of this sac, but no hernia could be found. Without doubt the last-mentioned swelling was due to an infantile sac (fig. 16), which was afterwards discovered. The child survived thirty-six hours, and it was found that there was an ante-mortem intussusception about the junction of the jejunum and ilium, which was evidently the actual cause of death. The left processus vaginalis was closed, and the right had the peculiarities which have been mentioned. The infantile sac was nearly an inch and a half deep, and a well-marked plica vascularis run up its hinder wall to the intestine. The mesentery was three inches long, and, together with the transverse mesocolon, attached one and a half inch above the base line. The ilium passed easily one inch beyond the right crural arch, and touched the spine of the pubes. The cæcum also touched the right crural arch, and the sigmoid flexure reached one inch beyond the left crural arch, which was just touched by the jejunum. The great omentum was small, and did not reach the lower limits of the abdomen.

This case throws light upon the pathology of infantile hernia, and together with others, will be referred to again before the close of these lectures. It also contradicts the argument used by Mr. Kingdon,* and already quoted, to the effect that a congenital hernial sac may be present, but that intestines do not enter it, because the mesentery is too short to permit them.

Case II.

Left Inguinal Sac, with Retained Testicle—Age Eighteen.

The following case exemplifies interesting points in the history of congenital hernia:—

The subject was a youth, eighteen years of age, who died with an affection of the liver; that organ was enormously enlarged, and weighed eighteen pounds. The left side of the scrotum was small and ill-developed, and there was no testicle in it; but the right side was natural, and contained a gland of the usual size.

* *Vide ante*, page 6.

A peritoneal pouch protruded an inch and a quarter from the left external abdominal ring, and its fundus was covered by a thin layer of intercolumnar fascia and some cremasteric fibres. The lower end of this pouch was rounded, and no gubernacular fibres were inserted into it. When the abdomen was opened the left testicle was found lying within the abdomen, close to the mouth of the processus vaginalis (*vide* fig. 17, p. 48). The mouth of this pouch was very much closer to the anterior superior spine of the ilium than is usual, the distance between them being an inch and a quarter; it was also an inch and a quarter outside and away from the deep epigastric artery. The sac and testicle were removed together, and will be described presently. The flexura duodeno-jejunalis was very tightly held four inches above the base line, and the height of the transverse mesocolon was the same. The disposition of the cæcum and colons was normal, but the sigmoid flexure had a long mesentery, and could be drawn an inch and a half beyond the left crural arch. The ilium reached, but could not be pulled beyond, the crural arches.

The pelvis was smaller than usual, and the antero-posterior diameter of the outlet was three inches, the transverse diameter of the outlet being two inches.

In this case there is nothing particular to say concerning the length of the mesentery or the excursion of the intestines, except that the latter was less than usual. The chief interest centres in the hernial sac, which may now be described.

Of course the hernial sac represented the processus vaginalis, and it is so well known that that pouch precedes the transition of the testicle that it is unnecessary to comment upon the fact that it has done so in the present case. The extraordinary distance of its mouth from the deep epigastric artery and from the spine of the pubes may be explained by recalling that, as I have pointed out elsewhere,* the testicle as it proceeds during fœtal life towards the scrotum passes outside the hypogastric arteries. During early fœtal life each of these vessels is of enormous relative size, and projects outwards towards the anterior superior spine of the ilium.

* "Hunterian Lectures on the Development and Transition of the Testicle," 1888, p. 89.

Afterwards, as the pelvis develops, each of the hypogastric arteries alters its position, inclining towards the middle line, and its place is taken by the deep epigastric artery. Thus the mouth of the processus vaginalis, being outside the hypogastric artery, is during early fœtal life much nearer the anterior superior spine of the ilium, and it seems reasonable to suppose that this position has, for some unknown reason, been retained in the present instance. This particular point in the morbid anatomy of congenital hernial sacs has never been raised before, and it will be interesting to ascertain whether the external position of the mouth of the sac is a frequent one.

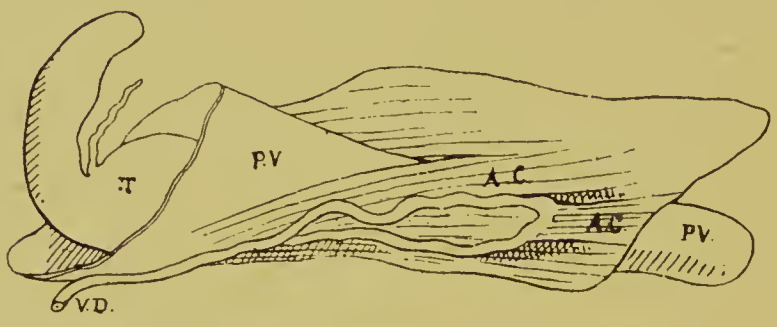


Fig. 17.

Retained Testicle. A.C., Ascending Cremaster. P.V., Processus Vaginalis. P.V.*, Processus Vaginalis, protruding from external Abdominal Ring. T., Testicle. V.D., Vas Deferens. The muscular fibres of the ascending cremaster come from the transversalis and internal oblique muscles.

The hernial pouch itself occupied the inguinal canal, which, as the foregoing implies, was of unusual length. The testicle lay almost within its mouth (*vide* fig. 17), and was of the usual size and appearance, except that the head of its epididymis was unusually long, and a long thin hydatid of Morgagni was attached near its base. The vas deferens looped downwards from the epididymis towards the fundus of the processus vaginalis, and a band of muscular fibres was inserted into the extremity of its loop (*vide* fig. 17). These muscular fibres represent those which I have called the ascending cremaster. Their insertion into

the vas deferens is quite in accordance with the history of their development, because the gubernaculum and ascending cremaster have the following insertions, during fœtal life, which are also acquired in the order in which they are given: 1, into the processus vaginalis; 2, into the right and left genital strings (vas deferens or uterus); 3, into the epididymis and body of testicle; 4, into the peritoneum of the back of the abdomen. In the present instance all of these insertions were represented, except that into the end of the processus vaginalis. No reason could be found to account for the non-transition of the gland.

Case III.

Congenital Hernia, without Elongation or Prolapse of the Mesentery —Age Twenty-four Years.

A well-built man, aged twenty-four years, five feet five inches high. He was said by his mother to have had a rupture four years, and to have worn a truss for the same period. On January 28th, 1889, a small hernia came down suddenly, and became acutely strangulated. An operation was performed fourteen hours after by Mr. Thomas Smith, who has kindly allowed me to make use of the case, and who opened the sac and returned the intestines. Death resulted soon afterwards, from perforation of the intestine and peritonitis. Dissection showed that there was a long and narrow congenital hernial sac, with a well-defined plica vascularis running up its posterior wall. The spermatic vessels were closely related to the sac, but were by no means inseparable. The mouth of the sac was not much more than half an inch in diameter, and there were no peritoneal bulgings. The mesentery was six and a half inches long, including the width of the intestine, and exceedingly well and strongly suspended at four and a half inches above the base line, and the same remarks and measurements apply to the transverse mesocolon. The range of the intestines was, as might be expected from the foregoing, less than is customary. The cæcum just touched the right crural arch. The mesentery belonged to the first variety, and therefore both its ends were fixed. The ilium could just be made to touch each crural arch, and also the pubic spines. The meso sigmoidea was four and a half

inches long, and attached four and a half inches above the left crural arch ; its range of downward movement was one inch beyon d the left crural arch. The strangulated gut was a piece of ilium eight inches long and the same distance from the cæcum ; it was the only portion which reached as far as the pubic spines, and, as I am informed, only caused a very small hernia, a mere bubonocele. The large intestines and other organs were perfectly normal.

Thus this unfortunate man was, so far as the length and attachments of his intestines were concerned, less predisposed to hernia than is usually the case. The fault lay in a patency of the processus vaginalis, and with this exception his abdominal walls were natural, and had no protrusions or bulgings. The hypogastric region was smooth, and the margins of the hernial apertures flush with the rest of the peritoneum (fig. 14).

Case IV.

Congenital Hernia, without Lengthening or Prolapse of the Mesentery —Age Twenty-four Years.

A well-built male, aged about twenty-four years, and five feet seven and a half inches high, who was under the care of Mr. Morrant Baker, to whom I am indebted for permission to mention it. The history given was very vague. The rupture, which was upon the right side, had existed some years, and had probably been strangulated three days. At the operation there was fæcal extravasation into the sac. The herniated parts were a piece of ilium, which was perforated, and some omentum. At the operation the gut was laid open and the stricture left undivided, but he died a week after, with symptoms of peritonitis and exhaustion.

The following condition was ascertained at the necropsy: The sac was that of a congenital hernia, and the tunica vaginalis extended upwards as far as the crest of the pubis, where it became very narrow, and was closed by recent adhesions, whilst the upper part of the processus vaginalis was more capacious, and contained a loop of ilium, whose lowest part lay on the pubic crest. This portion of gut was twelve inches from the ileo-cæcal valve, and had a mesentery four and a half inches long, which was attached

nearly four inches above the crural arch. By enlarging the wound, and by pulling gently, more intestine could be drawn into the sac, enough to have allowed of its resection. Both ends of the mesentery were fixed, and its widest part measured seven and a half inches, including the width of the intestine, which was greatly distended, with signs of commencing peritonitis. The flexura duodeno-jejunalis was four inches above the base line, as was also the transverse mesocolon; the latter was three and a half inches wide, and the great omentum five inches long, slender, and descending just beyond the umbilicus; its range, however, was greatly curtailed, owing to the distension of the small intestines. The downward range of the intestines was as follows: The cæcum touched the right crural arch, but the ilium passed an inch and a half beyond that boundary, touched the crest of the pubes, and also the left crural arch. The colons were normal, but the left kidney was absent, together with its ureter, the right kidney being hypertrophied. The mouth of the hernial sac was small and level with the rest of the peritoneum, and a very prominent right hypogastric fold ran upwards past its inner side. The left hypogastric fold was insignificant, and there were no congenital or acquired hypogastric fossæ on that side. The plica vascularis could not be seen within the abdomen, but was present in the lower part of the sac, being one inch wide at its junction with the epididymis.

In this case the length of the mesentery and the suspension of the intestines were perfectly normal, as was also their downward excursion. The fault lay entirely in the abdominal wall, and was a congenital patency of the processus vaginalis.

Case V.

Oblique Inguinal Sac, without Elongation or Prolapse of the Mesentery —Age Twenty-eight Years.

The subject was a male, twenty-eight years of age, and five feet four inches high, who had a peritoneal pouch an inch deep at the right internal ring; this pouch was considered to be congenital, because it was narrow and pointed below; the peritoneum over the right femoral ring of the right side was also slightly bulged, and the

hypogastric folds very prominent. The man had been a plumber, and although inquiry was made, it was stated that he had never had a hernia. The mesentery was eight and three-quarters inches long, including the width of the intestine, and, together with the transverse mesocolon, was attached four and a half inches above the base line. The excursion of the intestines was as follows: The cæcum, which was very movable and lay in the pelvis, touched the spine of the pubes, and also passed two inches beyond the right crural arch; the ilium also passed two inches beyond the same landmark, an inch beyond the pubic spine, and two inches beyond the left crural arch. The colons and kidneys were normal.

In this case the mesentery was long for the man's age, but nevertheless it was shorter than it is in many of those who have neither hernial sacs nor herniæ, and as far as the history can be trusted does not seem to have been associated with an actual hernia. The excursion of the intestines was not much increased either, because although the mesentery was long, its suspension was high. The case illustrates very well, if the history is to be trusted, that a hernial sac and a free excursion of the intestines out of the abdomen may co-exist without causing an actual hernia.

Case VI.

Congenital Hernia, without Elongation or Prolapse of the Mesentery—Age Thirty-one Years.

A strong and healthy man, aged thirty-one years; height, five feet eleven inches. He had suffered from a hernia on the right side for nearly three years. It became suddenly and acutely strangulated, but was not operated on for nearly thirty hours. The sac was opened in the ordinary way, and its contents, which consisted of gut and omentum, dealt with, the gut being returned and the omentum taken away; afterwards the hernial sac itself was ligatured and removed. Death ensued in a few hours (forty hours after the first onset), from general peritonitis, due to perforation of the part of the intestine which had been the seat of strangulation. The hernial aperature was three-quarters of an inch in diameter, and there were no bulgings of the peritoneum, the mouth of

the sac being flush with the rest of that membrane. The mesentery was six inches long, and strongly held, three and a half inches above the base line; the height of the transverse mesocolon was the same. The ilium passed two inches beyond the right crural arch, and one inch beyond the spine of the pubes; the jejunum just touched the left crural arch. The colons and cæcum were quite normal, as were also the other abdominal viscera. A portion of ilium was almost gangrenous. The hernial sac was an ordinary congenital sac with the testis at its bottom.

Although these notes are by no means exhaustive, yet they clearly show that in this case there was no elongation of the mesentery. Moreover, both the mesentery and the transverse mesocolon were well suspended at their proper height. The range of movement of the intestines was more than in some of the other cases, but did not exceed what is usual in a man of thirty-one years of age. The fault lay in the congenital patency of the right processus vaginalis. The presence of omentum in the sac was an accidental complication, and as far as could be judged, that structure was excessive in neither length nor bulk.

These cases of congenital hernia are not so numerous as could have been wished, but they belong to a class which affords comparatively few opportunities for examination. They suffice, however, to show that the general proposition which states that hernia is due to an elongation of the mesentery cannot be sustained. In none of these was the length of the mesentery greater than is usually met with in subjects quite free from hernia. Indeed, elongated mesenteries seem hard to find, and are probably met with in very long-standing and neglected cases, such as the one described in the first lecture. The long mesentery which was associated with the infantile sac (Case I.) was not an acquired condition, but a peculiarity which belongs to the infant's time of life.

In the last of these lectures other reasons will be advanced which tend to the belief that an elongation of the mesentery has no very important share in the pathology of congenital hernia.

But the foregoing cases of congenital hernia also show that the affection is not due to any fault in the suspensory apparatus

of the mesentery. The flexura duodeno-jejunalis and the transverse mesocolon were high above the base line in every instance, and prolapse of the colons and kidneys is conspicuous by its absence. When I lecture upon acquired hernia it will be shown that prolapse of the mesentery plays an important part in its pathology, and also that prolapse of the mesentery is a condition which clinically affords unequivocal signs of its existence. Now, inasmuch as those signs are never present in cases of congenital hernia, I venture to believe that prolapse of the mesentery does not form part of their pathology. Of course, it is possible that as a person with congenital hernia becomes old prolapse of the mesentery may supervene, but merely as an accidental complication, such as might happen to any ordinary individual.

Next, the excursion of the intestines was not increased in these cases of congenital hernia. This follows from the fact that they had no prolapse or elongation of the mesentery. Indeed, in some of the cases the range of the intestines was so restricted that the strangulation barely involved the whole calibre of the intestine.

Children must be excepted from these statements, because, as I have already said, their mesenteries are long in proportion to the size of their abdomens, and consequently the excursion of their intestines is increased.

Thus, an adult with congenital hernia has no elongation or prolapse of the mesentery, and no increase in the downward excursion of the intestines. The fault is a developmental defect in the abdominal wall—namely, non-obliteration of the processus vaginalis. Therefore I venture to submit that on pathological grounds this class of case is particularly suited for remedial operations.

Acquired Hernia.

The cases of acquired hernial sacs or herniæ may be arranged in groups, which are differentiated from one another by the conditions which exist within the abdomen. The first group includes cases of acquired hernia in which there was neither prolapse nor elongation of the mesentery, and in which the hernial sac was presumably due to a lack of resistance in the abdominal walls.

The second group includes cases of acquired hernia in which there was no elongation of the mesentery, but in which the flexura duodeno-jejunalis and the root of the mesentery and its hinder

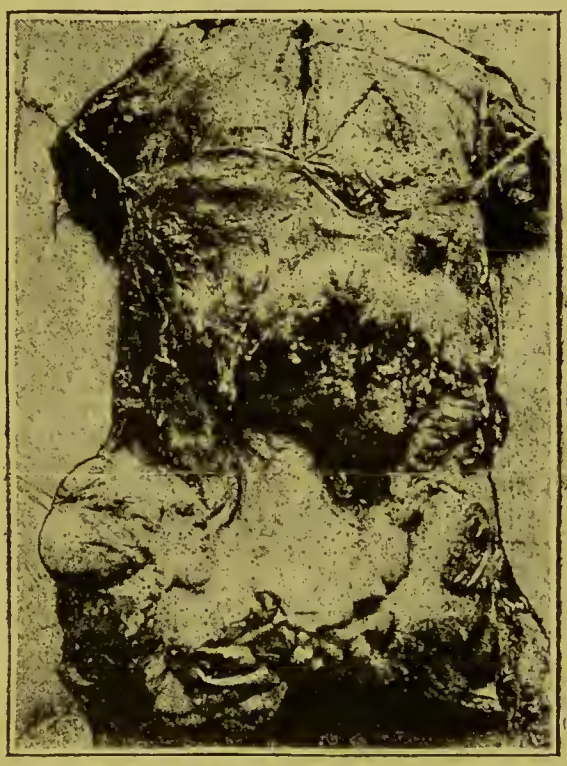


Fig. 18.

Prolapse of the Mesentery and of the Transverse Mesocolon and Hepatic Flexure of the Colon. From a photograph taken by Mr. C. S. Patterson. The subject was a male *æt.* 68, who had an oblique acquired inguinal sac on the right side, and a bulging of the left middle hypogastric fossa. The mesentery was 8 inches long, and the transverse mesocolon 7 inches, and together with the great omentum 11½ inches long. The flexura duodeno-jejunalis and transverse mesocolon were an inch and a half above the base line, and the hepatic flexure just above the iliac crest. The cæcum passed 3 inches beyond the right crural arch, the ilium the same distance beyond that landmark, and 2 inches beyond the spine of the pubes and left crural arch. The great omentum touched the crest of the pubes. The kidneys were small and contracted but not prolapsed. This case is given in figs. 19 and 20, but is not further described.

attachment had become obviously lower in the abdomen (*vide* fig. 18). This condition is referred to in these lectures as "prolapse of the mesentery." The third class includes cases of acquired hernia in

which there was no elongation of the mesentery, but in which there was prolapse of the mesentery complicated with prolapse of other organs, especially of the transverse mesocolon, hepatic and splenic flexures of the colon, and of the kidneys and other organs.

The term "simple prolapse" will be applied to those cases in which the mesentery alone is prolapsed, and the term "complicated prolapse" to those in which both the mesentery and other organs are affected.

It also seems probable that prolapse of the mesentery should be further classified as "partial" and "complete." In the first lecture it was shown that from the point of view of suspension the root of the mesentery was by far the most important part, and the cases which I am about to narrate suggest that it may descend without the lower attachments being involved, thus constituting a "partial prolapse." But I am unable to adduce a proper amount of evidence upon this particular point, because I was not at first aware of the importance of its investigation by measurement. On the other hand, there is no question but that the lower end of the mesentery often accompanies the root in its descent, and this complete descent will in future be referred to as "complete prolapse."

The various cases of acquired hernia which are comprised in the above-mentioned groups are, as might be expected, never quite alike, and therefore it is proposed, as in the case of the congenital herniæ, to present them with some detail. This is the more necessary because, as far as can be ascertained, the branch of their pathology which is mainly treated of in these lectures has hitherto received but little attention. Before describing the cases themselves it may tend to clearness if they are briefly reviewed with special reference to three cardinal points—namely, the length of the mesentery, the height of the mesentery, and the excursion of the intestines

The Length of the Mesentery in Cases of Acquired Hernia.

The length of the mesentery has been measured in twenty-one people with acquired hernial sacs or herniæ, and whose ages

ranged from thirty-one to eighty-five years. In none of them did the mesentery exceed the length which is ordinarily met with in people of their time of life. The longest mesentery, with the exception of the case of local elongation, and always remembering that the measurement includes the width of the

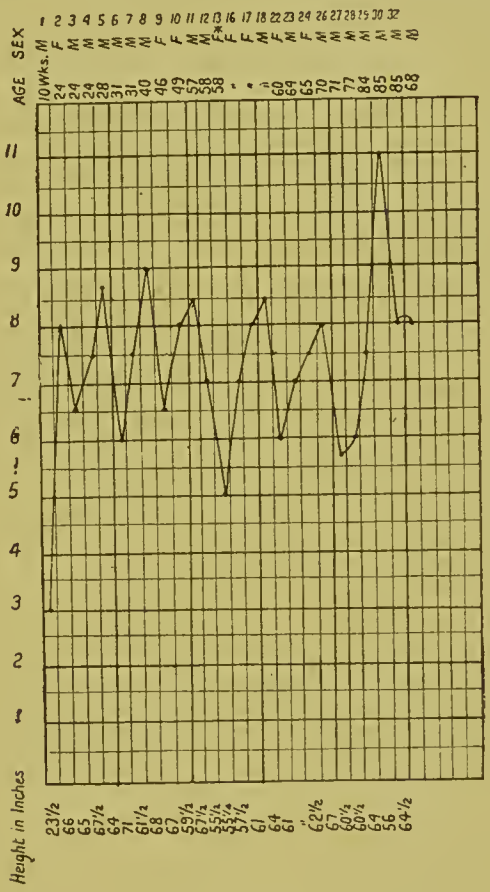


Fig. 19.

Scheme showing the Length of the Mesentery in Cases of Inguinal and Femoral Hernia. The Case marked with a star is not given in Fig. 20. With the exception of Case II., the first six cases were congenital. Compare this figure with fig. 12, p. 37.

intestine, was nine inches, and the shortest four and a half inches.* In two instances the mesentery was eight and a half inches long; in five, eight; in four, seven and a half; in three, seven; in one, six and a half; in two, six; in one, five and

* This case is omitted from figs. 19 and 20, but is given at p. 63, Case IV.

three-quarters ; and lastly, in one, five inches long. It is noteworthy that in as many as nine the mesentery should be below the average length, namely, seven and a half inches.

The Height of the Mesentery in Cases of Acquired Hernia.

The height of the flexura duodeno-jejunalis and of the root of the mesentery has been ascertained in twenty-eight cases of acquired hernial sacs or herniæ (fig. 20). The ages of these ranged

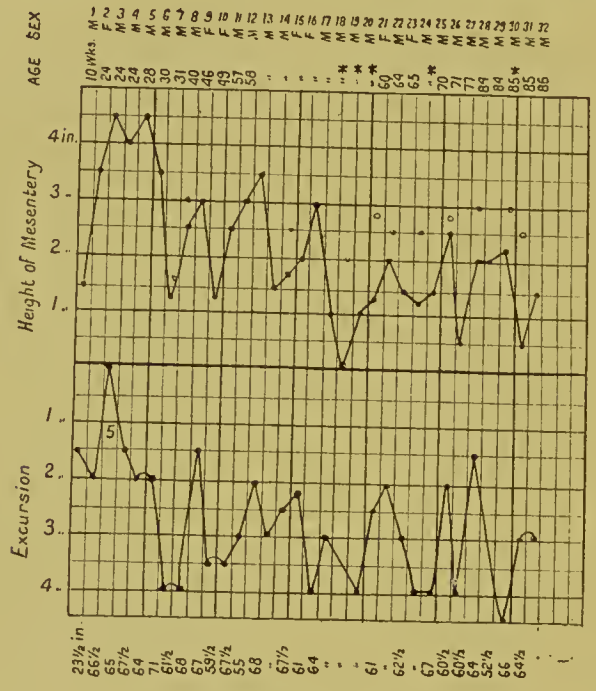


Fig. 20.

Scheme made from Cases of Inguinal and Femoral Hernia, to show the Height of the Mesentery and the Downward Excursion of the Intestines. The dots mark the Height of the Transverse Mesocolon, and where they are not put the Height of that fold corresponded with that of the Mesentery. The cases marked with a star are not given in fig. 19, except case 30, in which there was local elongation of the mesentery (*vide* p. 22). As in fig. 19, the first six cases, with the exception of No. 2, were congenital.

from twenty-four years in a woman with femoral hernia to eighty-six years. The measurements given in the first lecture seem to show that the root of the mesentery ought to be at least three inches above the base line (*vide* fig. 12, p. 37), and from what has just been said we should expect that some of the measurements (those from cases

belonging to the first group) would reach or perhaps surpass this standard. In the woman of twenty-four years of age who had a femoral rupture the flexura was four inches above the base line; in a second case, of a different nature, and perhaps congenital, it was three and a half inches, and in four others three inches, above the base line. In all the other cases the flexura duodeno-jejunalis and root of the mesentery was much lower than usual. In one instance it lay at the same level as the base line; in two it was half an inch above it, in two an inch above, in four an inch and a quarter above, in four an inch and a half above, in one an inch and three-quarters above, in four two inches above, and lastly in three two and a half inches above (*vide* scheme, fig. 20). If these measurements be compared with those obtained from people without acquired herniæ or bulgings of the abdominal wall the difference is very striking, and without doubt the low position of the mesentery in these cases of acquired hernia is one of the most important factors in their pathology.

The Excursion of the Intestines in Acquired Hernia.

In subjects without hernial sacs the intestines, it may be remembered, were usually able to pass beyond the lower limits of the abdomen. The greatest downward excursion was three inches,* and was met with in eleven instances; the smallest excursion was in those cases in which the small intestines could just be made to touch the crural arches or pubic spine, and this happened in twelve cases (fig. 12, p. 37).

In twenty-seven cases of acquired hernia the smallest excursion of the small intestines was an inch and a half, but this occurred in only three instances; in seven others the excursion was four inches (*vide* fig. 20).† Between these extremes were other cases, two of which had an excursion of three inches and a half, and seven an excursion of three inches. Thus, without going into further particulars, it may be said that the downward excursion of the intestines is greatly increased in acquired hernia.

* In one case (No. 59, fig. 12, p. 37) the excursion was four inches, but here the flexura duodeno-jejunalis was only two inches above the base line.

† The case of local elongation (No. 30, fig. 20) excepted.

In the next place, an analysis of the cases shows that almost without exception the increased excursion of the intestines in acquired hernia is associated with a low attachment of the mesentery. The exceptions to this rule are more apparent than real, and are accounted for by the extreme variability of the length of the mesentery; and it has just been said that, with the exception of the case of local elongation given in the first lecture (p. 22), the length of the mesentery in those with acquired hernia ranged from nine to four and a half inches.

Before giving the cases in detail a few instances may be given to support the foregoing propositions. In the two cases in which the flexura duodeno-jejunalis was half an inch above the base line the intestines passed four and three inches beyond the lower limits of the abdomen; in two cases, in which the height of the flexura was an inch, the excursion was three inches and four inches; in four cases, in which the height was an inch and a quarter, the excursion in two was four inches, in one three and a half, and in one two and a half; but the latter is a very good instance of the influence which the length of the mesentery may have in modifying the excursion of the intestines, for it was only six inches long.

The question of the excursion of the intestines will be referred to again in discussing the mechanism of prolapse of the mesentery, and then it will be shown that in the latter condition not only is the range of downward movement of the intestines increased by the prolapse, but that the direction of the excursion tends to be altered.

Without further premise we may proceed to give the details of the cases of acquired hernia, and begin with the first group.

Cases of Acquired Hernia without Prolapse or Elongation of the Mesentery, and Presumably due to a Fault in the Abdominal Wall.

Case I.

Right Femoral Enterocele, without Prolapse or Elongation of the Mesentery—Age Twenty-four Years.

Although the following case was a mortifying failure, I feel that it ought to be placed upon record.

The patient was a woman twenty-four years of age, five feet six

and a half inches high, and who had had a hernia five years; her father had suffered from the same complaint; she was married, but had never borne children. When admitted into the Great Northern Hospital there was a hernia on the right side, which, although she had been under the care of a practitioner, had been strangulated seven days; there was also some peritonitis, but no collapse. I performed herniotomy, and after opening the sac, divided Gimbernat's ligament and drew the gut down a little way; some superficial ulceration of the gut was brought into view, but as it did not seem deep, and as reduction was quite easy, the intestine was returned. My assistant then introduced his finger into the femoral ring, and when it was withdrawn a gush of fæces followed. Laparotomy was performed in the middle line, the perforated intestine drawn out and fixed, and its opening enlarged, the peritoneum flushed with warm boracic lotion, and a drain introduced into the femoral ring. The patient was relieved by the artificial anus, but died the following day of septic intoxication.

At the post-mortem some peritonitis was found, and the following measurements were obtained: The mesentery, including the width of the intestine, was eight inches, and together with the transverse mesocolon, was attached three and a half inches above the base line. The downward range of the intestines was as follows: The cæcum touched the right crural arch; the ilium passed two inches beyond the same landmark, touched the pubic spines and also the left crural arch. The colons and other abdominal viscera were normal.

The measurements in this case need little comment. The range of the ilium was, perhaps, slightly increased; but the mesentery, which, exclusive of the width of the gut, was barely seven inches long, could hardly be considered elongated. Doubtless the laxity of the pelvic parietal peritoneum, which Mr. Kingdon * lays stress upon, was the predisposing cause of the hernia.

The ending of the case was due to a series of unfortunate events. The length of time the strangulation was allowed to remain unrelieved shall be passed over in silence. I committed an

* "On the Causes of Hernia," Med.-Chi. Trans., 1864, vol. xlvii., p. 306.

error of judgment in returning the ulcerated bowel, and another in permitting my assistant to explore the ring. An artificial anus was established because there was already peritonitis, and because after prolonged obstruction paralysis of the intestines exists, and because it was thought that the patient would not live through the prolonged manipulation which resection entails.

Case II.

Femoral Pouches on both Sides, without Elongation or Prolapse of the Mesentery—Age Forty-six.

The following case belongs to the class of acquired hernia in which there was neither elongation nor prolapse of the mesentery, and in which there is presumably a fault in the abdominal wall.

The patient was a female forty-six years of age, and five feet seven inches high. She had a protrusion of the peritoneum through the right femoral ring, rather more than half an inch deep, and another of a smaller size at the left femoral ring. The mesentery was six and a half inches long, and the flexura duodeno-jejunalis was three inches, and the transverse mesocolon three and a half inches, above the base line ; the end of the mesentery held the intestine close against the psoas muscle, three inches above the right crural arch. The downward excursion of the intestines was as follows: The cæcum passed three-quarters of an inch beyond the right crural arch, the ilium two and a half inches beyond the same landmark, an inch beyond the spines of the pubes, and an inch and a half beyond the left crural arch. The colons were quite normal, but the sigmoid flexure had no mesentery, and crossed the psoas three inches above the left crural arch. This part of the intestine could not have been drawn into the ordinary inguinal colotomy wound without much dragging and displacement of the peritoneum.

I believe that this case exemplifies a state of things which exists in many of those females who have small femoral protrusions. The femoral apertures seem to have been so weak as to have been unable to resist the pressure of the intestines, although unincreased by either prolapse or elongation of the mesentery.

Case III.

Right Femoral Pouch, without Elongation or Prolapse of the Mesentery—Age Fifty-eight.

A male subject, fifty-eight years of age, and four feet seven and a half inches high. The middle hypogastric fossa of the right side was deep and led directly into a small femoral pouch. The mesentery was seven inches long, and, together with the transverse mesocolon, was attached three inches above the base line. The cæcum touched the right crural arch, but the ilium passed three inches beyond that landmark, and two inches beyond either pubic spine; the jejunum touched the left crural arch. The colons were normal.

In this instance there was apparently no elongation of the mesentery. Nevertheless the rather extensive excursion of the ilium calls for an explanation, for it seems reasonable to suppose that that was related to the formation of the hernial sac. My notes are deficient and too incomplete to help in this direction, but they suggest that in future cases the exact length, attachments, and range of movement of the lower part of the mesentery and ilium should be studied.

Case IV.

Right Oblique Inguinal Hernia, without Prolapse or Elongation of the Mesentery—Prolapse of the Right Kidney—Age Eighty.

The following is another case of the same class, and is that of a very spare man, eighty years of age, and five feet ten inches high, and who had worn a truss on the right side for some years The mesentery was only four and a half inches long, the duodeno-jejunal flexure three inches above the base line, and the transverse mesocolon three and a half inches above the same landmark. The cæcum touched the right crural arch, beyond which the ilium passed an inch and a half; the ilium also touched the crest of the pubes and the left crural arch. On the right side there was the sac of an ordinary oblique inguinal hernia, which admitted the tip of the index-finger; there was a slight bulging of the peritoneum at the left internal abdominal ring.

His mesentery and intestine together weighed two pounds two ounces. No abnormality of the colons or omentum was observed, but the right kidney lay on the crest of the ilium, and its vessels ran very obliquely downwards to reach its hilum. The position of the left kidney was normal, but both were large and white.

Although prolapse of the mesentery seems common in the herniæ of old age, yet it is by no means inevitable, as is shown by this and other cases. The whole body and the abdominal walls of this man were very thin and emaciated, and it seems reasonable to infer that, in the absence of other causes, they were insufficient to resist the pressure of intestines. The latter did not enjoy a greater range of downward movement than is found under normal circumstances.

The second group of acquired hernia may be taken next, and although they resemble the previous one in the absence of any elongation of the mesentery, yet they are clearly separated from them by the prolapse of the mesentery which is associated with the hernia.

Cases of Acquired Hernia with Simple Prolapse of the Mesentery.

Case V.

Double Femoral Sacs, with a Long and slightly Prolapsed Mesentery—Age Forty.

This case is that of a carpenter and brazier, who was forty years of age, and five feet eight inches high. The cause of his death was pleurisy. The pelvic peritoneum was loose, and there was a femoral pouch on either side. However, on inquiry, it was found that he had never worn a truss. His mesentery was nine inches long (always including the width of the intestine), and was attached two and a half inches above the base line; the transverse mesocolon was half an inch higher. The downward excursion of the intestines was as follows: The cæcum touched the right crural arch, but the ilium passed four inches beyond that landmark, and three inches beyond the left crural arch; the jejunum passed an inch beyond the left crural ach. The

small intestines and mesentery weighed together one pound thirteen ounces; the large intestines, without the rectum, weighed one pound five ounces. The colons were normal.

In this instance the mesentery was longer than is usual, but the elongation was general and far less than the local elongation which was found in the case of long-standing hernia. Its attachment was also much lower than is usually found in a man of such a height and age, and taken alone might be sufficient to account for the shallow femoral pouches. The excursion of the ilium is certainly very great, but is least on the left side. The length of the mesentery may have been congenital, but a fuller knowledge might reveal that it had merely shared in the condition which produced the prolapse and the relaxation of the pelvic peritoneum. Nevertheless, we may note that in cases without hernia such a length as nine inches is not infrequent. For this reason, I am inclined to attribute the hernial sacs more to the prolapse than to the length of the mesentery.

Case VI.

Double Inguinal Hernia, Right Oblique, Left Direct—Prolapse of the Mesentery, especially of its Lower End—Age Fifty-seven.

In the following case the low attachment of its lower end may perhaps, be ascribed to other causes which will be mentioned later.

The subject was a man aged fifty-seven years, five feet seven and a half inches high, and very fat and heavy; he had followed the calling of a cabman. On the right side there was the sac of an oblique inguinal hernia four inches deep, and on the left side a smaller direct inguinal sac one and three-quarters inch deep. The mesentery was eight and a half inches long, and, together with the transverse mesocolon, was attached two and a half inches above the base line. The end of the mesentery was of the short variety, so that the ilium lay closely in contact with the psoas. This part of the mesentery was at least two inches lower than normal, and its attachment was barely an inch from the mouth of the hernial sac. The downward excursion of the small intestines was more than is usual; the ilium reached three and a

half inches beyond the right crural arch, three and a half inches beyond the spines of the pubes, and two inches beyond the left crural arch. The colons were normal; the transverse mesocolon was nine inches long, and together with the great omentum eleven inches long; the latter could be made to reach the pubes; the cæcum reached an inch and a half beyond the right crural arch; the sigmoid flexure was tightly fastened by a peritoneal fold to the inner side of the mouth of the left sac. The kidneys were not prolapsed.

This case has no particular feature, and seems a good example of complete prolapse of the mesentery, and there was no special evidence of the end of the mesentery having been dragged down.

Case VII.

Right and Left Direct Inguinal Sacs, with Prolapse of the Mesentery—Beyond Middle Age.

The following case is one of the earliest measured, and is wanting in some particulars. The subject was a male, beyond middle age, who had on the left side the sac of a direct inguinal hernia which admitted the distal and middle phalanges of the index-finger. The mouth of this sac was bounded internally by the hypogastric fold and edge of rectus, and externally by the deep epigastric artery; the spermatic cord was behind the sac, and to its outer side. On the right side there was a hernial bulging with a sub-peritoneal lipoma at its end; this protrusion was also external to the hypogastric fold, but internal to the deep epigastric artery. These abnormalities were associated with a prolapse of the mesentery. The flexura duodeno-jejunalis was one and a half inches above the base line, but was very slightly held, and easily displaced downwards. The jejunum easily descended three and a half inches below the left crural arch, and nearly the same distance beyond the neck of the hernial sac. The ilium passed three and a half inches beyond the right crural arch, and also descended beyond the neck of the sac. The colons were normal, although the flexures were rather low, the hepatic being opposite the eleventh costal cartilage, the splenic opposite the tenth intercostal space. The cæcum lay in its usual

situation, and could, without much traction, be made to touch the right crural arch. The sigmoid flexure was three feet two and a half inches long, and the meso-sigmoidea was four inches long, and ended at the middle of the sacrum. The exact length of the mesentery was not noted, but I can remember there was no obvious elongation.

The omissions in the report of this case seriously detract from its evidential value. However, it demonstrates very clearly the prolapse of the mesentery, and also suggests that it is due to a fault in the suspensory muscle. The circumstance that the deepest sac was on the left side is significant, and, as I have argued elsewhere, is the outcome of the direct descent of the jejunum and ilium, permitted by the prolapse. It is to be regretted that the exact attachment of the lower end of the mesentery was not recorded, and also the condition of the great omentum.

Case VIII.

Sacs of Oblique Inguinal Hernia, Right and Left, with uncomplicated complete Prolapse of the Mesentery, but without Lengthening—Age Eighty-four.

A male who had attained the advanced age of eighty-four years, and who was five feet four inches high. On the right side there was a hernial pouch at least half an inch deep, and external to the epigastric artery, and on the left side a similar pouch three-quarters of an inch deep, and easily admitting the first joint of the index-finger.

The mesentery, including the width of the intestine, was seven and a half inches long, and its beginning at the duodeno-jejunal flexure was two inches above the base line, and its end two and a half inches above the crural arch ; the transverse mesocolon was three inches above the base line. The small intestines had the following range of downward movement ; they passed an inch and a half beyond the right crural arch, an inch beyond the left, and touched the pubic crest ; the cæcum touched the anterior superior spine of the ilium. The colons had no peculiarity, but the sigmoid flexure had a very short mesentery (less than an inch),

and crossed the psoas an inch and a half above the left crural arch.

There are several features of interest in this case. The prolapse of the mesentery was not large, but nevertheless the distance of the commencement of the mesentery and of the flexura duodeno-jejunalis from the transverse mesocolon, one inch, and its nearness to the base line, shows, I think, that it had occurred. The excursion of the small intestines can hardly be said to have been increased on the right side, but perhaps it was on the left. As I shall argue elsewhere, one of the effects of prolapse is to allow the intestines to exert their pressure on the left hypogastric fossæ as much, if not more, than upon the right. In the present instance the result was curious, because although the excursion of the intestines was less upon the left side than upon the right, nevertheless the left hernial sac was rather longer and deeper than the right. This may be accounted for by assuming that inasmuch as the left fossæ were called upon to bear an unaccustomed strain, therefore they afforded less resistance.

Acquired Hernia with Prolapse of the Mesentery, Complicated with Prolapse of other Structures.

Before discussing the pathology of prolapse of the mesentery, the next group of cases of acquired hernia may be proceeded with and will be found to have exceedingly clear characteristics. The hernia, besides being associated with prolapse of the mesentery, is also associated with prolapse of the transverse mesocolon, hepatic or splenic flexures of the colon, and of the kidneys and other organs.

It has long been known that certain forms of external prolapse might accompany hernia and conditions associated with prolapse of the mesentery. Sir William Lawrence* gives some statistics which throw light upon this question. Out of fifteen thousand seven hundred and eighty-six females the subject of hernia, no less than two thousand six hundred and thirty-five were also affected with prolapse of other organs, namely, of the uterus, anus, bladder, and vagina, in the proportions given below.

* "A Treatise on Ruptures," by Wm. Lawrence, Fifth Edition, 1839, p. 11.

Prolapsus ani	.. ..	243
Prolapsus uteri	.. ..	2,196
Prolapsus vaginæ	.. ..	37
Prolapsus vesicæ	.. ..	159
	Total	2,635

Prolapse of the anus also occurred in male subjects, but in a much smaller proportion, namely, four hundred and forty-six times out of sixty-seven thousand seven hundred and ninety-eight cases. Thus amongst the women hernia was complicated with some other form of prolapse in the proportion of one in six.

Mr. Doran * has given some interesting family histories, which bear upon the same point, and as I proceed with the details of the cases it will be seen that morbid anatomy and pathology fully bear out the clinical evidence. As usual, the cases are arranged according to their ages.

Case IX.

Acquired Inguinal Hernial Sac of Right Side, with Prolapse of the Mesentery and Transverse Mesocolon—No Elongation of the Mesentery—Age Thirty-one.

A male, thirty-one years old, and five feet one and a half inches high. On the right side there was the sac of an oblique acquired inguinal hernia, which was three inches deep, empty, easily separable from the constituents of the cord, and easily drawn into the abdomen. The left hypogastric fossæ were deep and bulged ; those of the right side were also very deep, and the middle one led like a funnel towards the mouth of the hernial sac. The rest of the peritoneum and abdominal walls seemed strong and resistant. The mesentery was seven and a half inches long, and together with the transverse mesocolon was attached one and a quarter inch above the base line. The cæcum touched the right crural arch, and the jejunum the left. The range of the ilium was four inches beyond the right crural arch, and two inches beyond the left. The colons and sigmoid flexure were normal. The weight of the small intestines, together with

* Obstetrical Soc. Trans., vol. xxvi., p. 88, "The Relation of Prolapse of the Vagina to Hernia."

the mesentery, was one pound fourteen ounces; the large intestines weighed fifteen and a half ounces.

There are several interesting points in this case. The acquired hernial sac was associated with a marked prolapse of the mesentery, for that structure is attached two inches lower than is usually the case. Moreover, the prolapse of the mesentery allowed an exceptional range of downward movement to the small intestines. The age of the subject is also to be noted; prolapse of the mesentery and acquired hernia will, I think, prove to be unusual so early in life, and perhaps there was in this case some exceptional reason for their occurrence. My notes, however, are defective in many particulars, especially as regards the previous history. However, the fact remains that the case was one of acquired hernia with prolapse of the mesentery, and without elongation.

Case X.

Double Femoral Pouches, with Prolapse of the Mesentery—Transverse Mesocolon—Hepatic Flexure of Colon and Right Kidney—Aged Forty-nine.

The following case illustrates the conditions which often accompany prolapse of the mesentery. The subject was a woman, forty-nine years old, and four feet eleven and a half inches high. There were femoral pouches on either side, the left being an inch, and the right about an inch and a half deep; both admitted the first phalanx of the thumb. The mesentery was eight inches and a quarter long in its widest part, including the width of the intestine, and two inches long at its end. The flexura duodeno-jejunalis was an inch and a quarter above the base line, and the end of the mesentery three inches above the right crural arch; the transverse mesocolon was an inch and a half above the base line. The excursion of the intestines was as follows: The cæcum passed an inch and a half beyond the right crural arch, the ilium three and a half inches beyond the same landmark, two and three quarters inches beyond the crests of the pubes, and two inches beyond the left crural arch, and therefore had an increased downward range, corresponding with the prolapse of the mesentery. The transverse mesocolon was six inches long, and

together with the great omentum eight; the hepatic flexure was an inch below the crest of the ilium, and the lower end of the right kidney an inch and three-quarters below the same bony ridge; the splenic flexure and left kidney were not prolapsed. The mesentery of the sigmoid flexure was five inches long at its widest part, which was close to its entrance into the rectum, and was attached four inches above the left crural arch. The liver was somewhat depressed, as though by tight-lacing, but this was not certain. The pelvis was very capacious, but the uterus was small and not prolapsed.

The notes of this case are fairly complete, and show, I think, very clearly the close relationship between prolapse of the mesentery and acquired hernia. The capaciousness of the pelvis should be remembered before we infer that the size of the hernia ought to correspond with the amount of the prolapse. It is evident that the first effect of that fault would be to permit the intestines to fall into the pelvis, from whence they would, as it were, overflow into the femoral and inguinal rings.

The prolapse of the mesentery seems also to have involved the whole of its attachment, because the lower end was at least an inch nearer the crural arch than is usual; but, without doubt, the upper attachment and suspensory ligament had suffered most The measurements also clearly show that the large intestines and great omentum could have had nothing to do with the formation of the hernial sacs.

Case XI.

Double Femoral Pouches, with Prolapse of the Mesentery, Hepatic Flexure of the Colon and of the Right Kidney, and without Elongation of the Mesentery—Age Sixty Years.

The subject was a spare and symmetrical female, sixty years of age, and five feet one inch high. When the body was recumbent there were no unusual abdominal protuberances, but the thorax was compressed as if by tight-lacing. The peritoneum was protruded at both femoral rings sufficiently to admit the tip of the index-finger. The mesentery, including, as usual, the width of the intestine, was six inches long; the transverse mesocolon,

including the width of the colon, was four and three-quarters of an inch long; the great omentum, which was slender and frayed out, added another five inches and three quarters to this length, and it passed two inches beyond the pubic crest; the transverse mesocolon was attached two and five-eighths inches above the base line; the flexura duodeno-jejunalis and beginning of the mesentery was one inch and a quarter above the same landmark. The end of the mesentery was three inches above the right crural arch, and as the mesentery belonged to the first variety, the end of the ilium was in contact with the psoas. The downward range of the intestines was as follows: The cæcum touched the right crural arch; the ilium passed two and a half inches beyond the same, an inch beyond both pubic spines, and an inch beyond the left crural arch.

Associated with the marked prolapse of the mesentery and the slight prolapse of the transverse mesocolon, the splenic flexure of the colon was opposite the twelfth rib, the hepatic an inch and a quarter above the base line, so that there was practically no right colon; the pylorus was two inches above the base line, and the curve of the duodenum more than an inch below, lying on the venter of the ilium; and the lower end of the right kidney, which was very movable, was an inch below the iliac crests; the left kidney lay in its usual position. There seemed to be no prolapse of the uterus, but the pelvis was very capacious, and contained a quantity of the small intestines. The sigmoid flexure had no mesentery. The liver protruded some distance (two inches) from beneath the rib cartilages.

The measurements of this case are reasonably complete, and it is, perhaps, unnecessary to comment upon them at any length. They show, I think, very clearly that the femoral pouches were due to the prolapse of the mesentery, and further, that that prolapse was not a consequence, but a cause. Moreover, this case fully establishes that prolapse of the mesentery is not a local fault, but part of a general pathological change, because it was accompanied by prolapse of the mesocolon, hepatic and splenic flexures of the colon, right kidney, and pylorus. Considering the amount of the prolapse and the increased range of

the intestines, it might have been expected that the hernial pouches would have been deeper ; but it may be remembered that the pelvis was very capacious, and I have often thought that in such cases as this the intestines first descended into the pelvis, and after they had filled it, bubbled over, as it were, and ultimately protruded the peritoneum over the weak femoral rings. Another point which this case exemplifies is that it does not necessarily follow that when the hepatic flexure is prolapsed the downward range of the cæcum is increased ; the attachments of that organ may be sufficient, under these circumstances, to maintain its position.

Case XII.

Right Femoral Sac, with Prolapse of the Mesentery, Transverse Meso-colon, Hepatic Flexure of the Colon, Kidney, and Pylorus, without Elongation of the Mesentery—Age Sixty-five Years.

The subject was a woman, aged sixty-five years, five feet two inches high, and who had a small femoral sac on the right side. The mesentery was seven and a half inches long ; the flexura duodeno-jejunalis was an inch and a half, the transverse meso-colon an inch and three-quarters, and the pylorus an inch and a half, above the base line ; the hepatic flexure of the colon was on a level with, and the lower end of the right kidney an inch below, the crest of the ilium ; the left kidney was two inches above the iliac crest ; the curve of the duodenum crossed the bifurcation of the right common iliac artery, an inch below the base line ; the liver projected two inches beyond the costal cartilages, but there were no marked signs of tight-lacing. The downward excursion of the intestines was as follows : The cæcum reached two inches, and the ilium three and a half inches, beyond the right crural arch ; the ilium also reached an inch and a half beyond the pubic spines, and the same distance beyond the left crural arch. The end of the mesentery was two and a half inches long and three inches above the right crural arch. The meso-sigmoidea was three and a half inches long, and crossed the psoas three and a quarter inches above the left crural arch.

In this case the prolapse of the mesentery was probably general, as its lower end was, perhaps, a little nearer the crural

arch than usual. The condition was also accompanied by prolapse of the usual organs. The lowness of the curve of the duodenum, although not unusual, deserves comment; this point does not seem, so far as I am aware, to have had the attention it deserves.

Case XIII.

Right Femoral Epiplocele, with Prolapse of the Mesentery and Hepatic Flexure of the Colon, and without Elongation of the Mesentery —Beyond Middle Age.

A female, rather beyond middle age, and four feet nine and a half inches high. There was a femoral pouch upon the right side, which admitted the first joint of the index-finger; the great omentum was firmly adherent to its front wall. The mesentery was seven inches long, and strongly held one inch and three-quarters above the base line. The transverse mesocolon was two and a half inches above the base line. The range of movement of the intestines was as follows: The cæcum touched the right crural arch, but the ilium passed two and a half inches beyond that landmark, and one inch and a half beyond the right pubic spine, and one inch beyond the left; the jejunum touched the left crural arch. The hepatic flexure of the colon was as low as the iliac crest, and the right kidney, which was not enlarged, was barely two fingers' breadth above the same point; the left kidney and colon were normal.

In this case the mesentery was not elongated, but very decidedly prolapsed. The adhesion of the omentum within the sac is an element of uncertainty in the interpretation of its causation. I thought, when making the examination, that the omentum was not entirely responsible for the formation of the sac, because it seemed to have no capability of descending as far as its fundus. On the other hand, the prolapse of the mesentery was more than sufficient to allow the intestine to play such a *rôle*. However, for want of information as to the early history of the case, and for want of general information as to the morbid anatomy of epiplocele, it seems impossible to throw further light upon this question. It is instructive to observe that very little

prolapse of the transverse mesocolon is associated with that of the mesentery, although there was some prolapse of the hepatic flexure of the colon and of the right kidney. As I have said elsewhere, these conditions are often associated with one another, and tend to show that in acquired hernia there is a general laxity of the suspensory apparatus.

Case XIV.

Right Femoral Sac, associated with Slight Prolapse of the Mesentery, Colon, and Kidney—Beyond Middle Age.

A female, beyond middle age, five feet one inch high. There was a femoral pouch on the right side, one inch deep; there was none on the left. The mesentery was eight inches long (always including the width of the intestine), and the duodeno-jejunal flexure was two inches above the base line; the transverse mesocolon was at the same level. The downward range of the intestines was as follows: The cæcum passed two inches beyond the right crural arch, the jejunum two and a quarter inches beyond the same landmark, two inches beyond the right pubic spine, and one a half beyond the left; the jejunum passed two inches beyond the right crural arch. The right and left colons had each a mesentery an inch and a half long, and the hepatic flexure lay just above the twelfth rib, whilst the splenic flexure was only two inches above the base line. The lower end of the right kidney was two fingers' breadth above the iliac crest, but the left kidney touched that bony ridge. The pylorus was two and a half inches above the base line, and the liver was normal. There was a slight constriction of the chest, attributable to tight-lacing.

In this case a small hernial sac is associated with a slight prolapse of the mesentery. The latter ought, perhaps, to be considered long, although it can hardly be said to exceed the length of the mesentery common in subjects beyond the middle period of life. Taken together, the length and the prolapse of the mesentery might have been expected to produce a deeper hernial pouch, but the pelvis was, my note says, very capacious and capable of containing a large part of the intestines. It is also to be remarked that the prolapse was by no means confined to the me

but that the colons and kidneys were also at fault, and it is especially interesting to note that the prolapse of the left colon was associated with a similar condition of the left kidney. The pylorus was also low, and had been influenced by the same circumstances as the organs which have just been mentioned. The effect of the tight-lacing must have been very slight, for the liver was not depressed or indented.

Case XV.

Right and Left Femoral Sacs, with Prolapse of the Mesentery and Transverse Mesocolon—Age Seventy-seven.

A well-nourished male, seventy-seven years of age, and five feet seven inches high. There was a femoral sac on the right side which admitted the index-finger, and a smaller femoral pouch on the left side. The mesentery was eight inches long, and the flexura duodeno-jejunalis was one and a half inches above the base line, the transverse mesocolon being one and three-quarters inch above the same landmark. The downward range of the intestines was as follows : The cæcum passed one inch beyond the right crural arch, the ilium four and a half inches beyond the same ligament, two inches beyond the spines of the pubes, and two and a half inches beyond the left crural arch. The hypogastric fossæ were deeper than usual, being bulged outwards.

This case needs little comment. The advanced age of the subject may afford an explanation of the prolapse of the mesentery.

Case XVI.

Double Direct Inguinal Hernia, with Prolapse of the Mesentery, Transverse Mesocolon, Duodenum, and Pylorus—No Elongation of the Mesentery—Age Seventy-seven years.

A male subject, seventy-seven years old, and five feet and half an inch high. Has had a hernia on the right side for eighteen years. There was a large direct inguinal sac on either side, the right being the largest, and contained omentum and transverse colon and omentum ; left sac was empty ; they both had very capacious and funnel-like mouths. The mesentery was six inches long, and its highest part was half an inch above the

base line; the transverse mesocolon had the same attachments. The ilium passed four inches beyond the right crural arch, and some distance beyond the spine of the pubes and left crural arch. The jejunum passed one and a half inches beyond the left crural arch. The lower part of the right colon had a mesentery, and the cæcum was very easily displaceable, but hardly entered the right hernial sac. The pylorus was very low, being one and a half inches above the base line. The curve of the duodenum was also low, being two inches below the base line.

In this case the mesentery was not elongated; indeed, it was rather shorter than is usual at such an advanced age. The length of the transverse mesocolon was not measured, as it ought to have been, but it had no obvious elongation, and as it had shared in the excessive prolapse of the mesentery, the presence of the colon in the hernial sac is easily accounted for. There was nothing to show that either the prolapse of the transverse mesocolon or an elongation of the omentum was the immediate cause of the hernia; but inasmuch as other cases show that the prolapse of the mesentery precedes that of the transverse mesocolon, it seems not improbable that the process of sac-formation was originally due to the small intestines.

Unusual Forms of Hernia.

It is convenient to mention here two unusual forms of hernia which have been met with, and which although not free from doubt, were probably of developmental origin.

Double Hernia.

Right side, Cæcocele with attachment of the Vermiform Appendix to the Back of the Sac—Left side, Empty Oblique Sac with Plica Vascularis—No Prolapse of the Mesentery.

The following notes were made from one of the earlier cases; they are imperfect, but the sacs are interesting, and therefore I have ventured to describe them.

The subject was a well-built male, five feet eight inches high, and beyond middle age. On the right side there was a hernial sac with the cæcum projecting, free and unattached, within its

capacious mouth. The vermiform appendix, which was six inches long, ran down the middle of the hinder wall of the sac, and was closely attached to it, except towards its lower end, where it had a small mesentery (fig. 21). The spermatic vessels and their accompaniments ran along the exterior of the sac, exactly opposite the attachment of the appendix;* the testicle had a separate

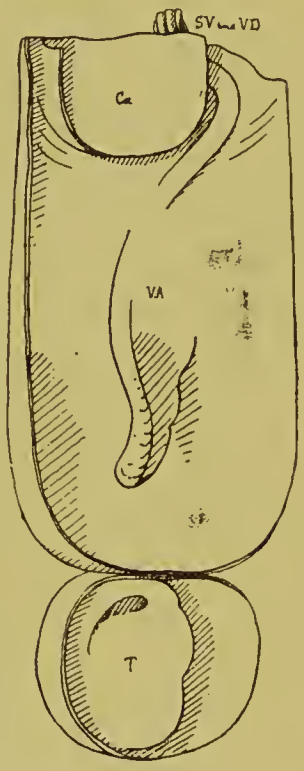


Fig. 21.

Cæcocele, with Attachment of Vermiform Appendix to Back of Sac. Cæ., Cæcum. V.A., Vermiform Appendix. T., Testicle. S.V. and V.D., Spermatic Vessels and Vas Deferens.

tunica vaginalis of the usual description. The empty sac on the left side was external to the epigastric artery, and was two inches deep; a fold of peritoneum, the plica vascularis, containing the spermatic vessels, ran upwards from its mouth to the sigmoid flexure.

* This specimen is in the museum of St. Bartholomew's Hospital, No. 2,111, and was shown at the Pathological Society in November, 1888.

The measurements of this abdomen were incomplete, and as regards the mesentery I can only remember that it was not elongated; but the following were properly taken, and it was found that the flexura duodeno-jejunalis was three and a half inches above the base line, and the transverse mesocolon four inches above the same landmark. The range of the intestines was as follows: The cæcum touched the right crural arch; the ilium descended two inches below the same, and one inch below the crest of the pubes; the jejunum touched the same landmark.

The pathology of this case is hard to interpret, but the morbid anatomy strongly points to a developmental origin. The pre-

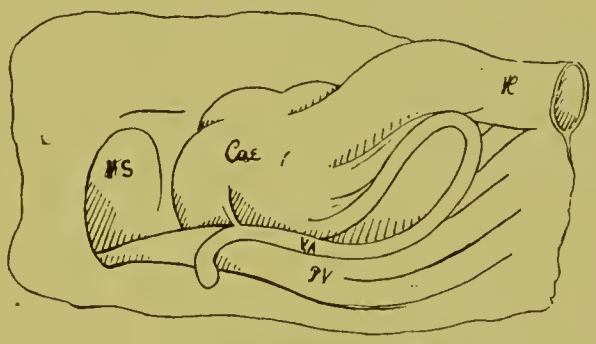


Fig. 6. (See also p. 23, *ante*.)

To show the fold (Plica Vascularis) which in the case of local elongation of the mesentery ran upwards from the sac to the vermiform appendix and ilium (p. 22 *et s.*). *Cae.*, Cæcum. *Il.*, Ilium. *M.S.*, Mouth of Hernial Sac. *P.V.*, Plica Vascularis. *V.A.*, Vermiform Appendix.

sence of the vermiform appendix upon the back of the sac seems to be explained by a case which has already been given, and in which the vermiform appendix ran along the edge of the plica vascularis, which fold ran from the mesentery of the ilium downwards into the mouth of the hernial sac (fig. 6). It is clear that had any further displacement of the peritoneum, such as that which occurs in the formation of hernial sacs, taken place in the case we are discussing, the plica vascularis, and with it the vermiform appendix, would have been carried down the hinder wall of the sac. The close mutual relations of the vermiform appendix and

spermatic vessels in the present instance supports the idea that the appendix owed its displacement to the above cause. Also there is nothing exceptional in the connection between the plica vascularis and the vermiform appendix, for in the lectures * which, as Hunterian Professor, I delivered in 1887 it was shown that on the right side of the fœtus the upper end of the plica vascularis adhered to the cæcum, vermiform appendix, ilium, and mesentery, and on the left side to the sigmoid flexure. Now it is more than a coincidence that upon the left side of the case under discussion a well-marked plica vascularis ran upwards from the mouth of the sac to the sigmoid flexure. The very close adhesion of the vas deferens, spermatic vessels, and internal cremaster to the back of the sack is also in favour of the congenital origin of the sac; it is usually admitted that in acquired hernia these various structures are never so closely related to the sac as they were in this specimen. The presence of the cæcum within the mouth of the sac in this case is mentioned later in that part of my lectures which deals with cæcocele. Assuming it is correct that this was a congenital hernia, I imagine that the sac owed its enlargement to the pressure of the ilium, which, after death and with the body recumbent, reached two inches beyond the right crural arch and one inch beyond the crest of the pubes. The enlargement of the sac not only displaced the vermiform appendix, but also stretched it, as is shown, I think, by its great length (six inches).

Although the absence of prolapse of the mesentery is no proof that these herniæ were congenital, yet, at the risk of being accused of arguing in a circle, I would point out that this indication is not without some diagnostic value, and tends to strengthen the general conclusion that the case was one of long standing congenital hernia.

Multiple Herniæ.

Oblique Inguinal Enterocele on Right Side, together with Small Acquired Inguinal and Femoral Sacs on Left Side—Retro-peritoneal Hernia of the Vermiform Appendix—Additional Blind Peritoneal Sac—? Infantile—without Elongation or Prolapse of the Mesentery.

* "Hunterian Lectures on the Development and Transition of the Testis," by Charles Barrett Lockwood, 1888, p. 84 *et s.*

In the following case four distinct varieties of hernia co-existed, namely, an oblique inguinal enterocele on the right side, a small acquired inguinal sac, and a small femoral sac on the left side, a retro-peritoneal hernia of the vermiform appendix, and, in addition, a curious blind sac of a doubtful nature. The

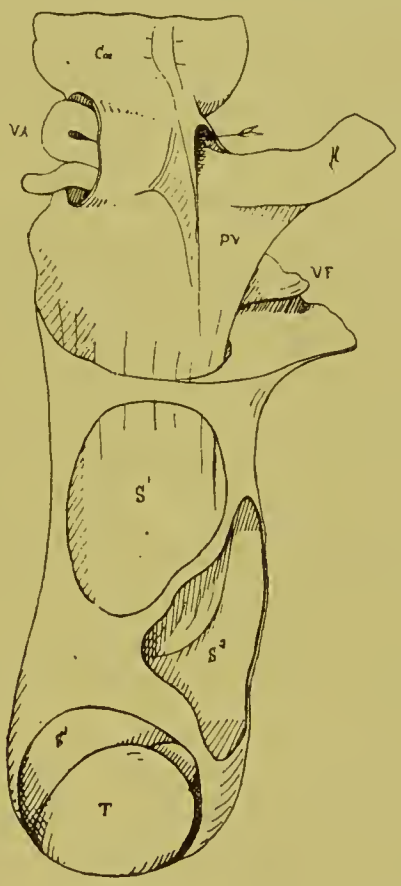


Fig. 22.

Cæ., Cæcum, lifted up. Il., Ilium. P.V., Plica Vascularis. S.[1], Hernial Sac. S.[2], Blind Sac. S.[3], Tunica Vaginalis. V.A., Vermiform Appendix. V.F., Vesical Fold. T., Testicle. An arrow has been placed in the mouth of the sac in which the vermiform appendix lay.

subject was an aged male, five feet four inches in height. The mesentery was eight and a half inches long, and, together with the transverse mesocolon, was attached three inches above the base line. The downward range of the intestines was greater

than usual, for the cæcum passed an inch and a half beyond the right crural arch, and the ilium four inches beyond the same landmark, and three and a half inches beyond the spines of the pubes. The jejunum touched the left crural arch, whilst the sigmoid flexure, which had a mesentery six inches long, and attached three inches about the middle of the left crural arch, reached two and a half inches beyond the latter. No reason could be found to explain the great downward range of the ilium; nor had the attachment of the lower end of the mesentery any obvious relation to it, for it was situated three inches above the right crural arch. The colons were normal. The hernial sacs upon the left side call for no remark; the middle hypogastric fossa was deep, and led straight towards them. The inguinal pouch on the right side was four and a half inches deep, and contained a loop of ilium. A fold of peritoneum, the plica vascularis, an inch and three-quarters wide, with the spermatic vessels in its midst, ran upwards from the inner side of the neck of the sac to end upon the under surface of the mesentery of the prolapsed gut (*vide* fig. 22, P.V. and Il.). This fold was joined by another prominent one, which ran transversely across the fundus of the bladder (V.F.).* The vermiform appendix was with difficulty discovered, because it lay concealed in a retro-cæcal fossa, the mouth of which was small and hidden by the cæcum (*vide* fig. 22, V.A.).

Although this case has many perplexing features, yet the herniæ can hardly be attributed to an elongation of the mesentery, for a length of eight and a half inches cannot be considered excessive for an aged person. Moreover, there was no prolapse of the mesentery, and yet its length seems insufficient to account for the very considerable downward range of the ilium. It is not unlikely that some other condition was present, with which I am unacquainted. Although acquired herniæ are met with in which there is neither elongation nor prolapse of the mesentery, yet in the absence of either of those conditions

* Cruveilhier mentions that this fold is seen when the bladder is empty ("Traité d'Anatomie Descriptive," vol. ii., p. 535).

such a deep pouch as that on the right side is very exceptional, unless due to congenital causes.

The persistence of the plica vascularis, and its attachment to the mesentery of the herniated gut, as I have elsewhere maintained, indicates a developmental defect, and the retro-peritoneal hernia of the vermiform appendix points in the same direction. With regard to the shallow acquired pouches on the left side, we have seen that such as they may occur quite independently of elongation or prolapse of the mesentery, and presumably owing to loss of resiliency of the peritoneum and the abdominal wall.

The retro-peritoneal hernia of the vermiform appendix is evidently a very rare and curious occurrence. Lichtenstern, who has paid great attention to such affections, does not mention an unambiguous instance,* either within his own observation or in the writings of others.

There seem to be two ways in which a retro-peritoneal hernia of the vermiform appendix can arise. In the first place, it is within the range of possibility that a free and movable appendix might in some way introduce itself into an already existing sub-cæcal or ileo-cæcal fossa ; but such an event must be of extreme rarity. In the next place, the vermiform appendix may become engaged in the sub-cæcal or ileo-cæcal fossa, whilst they are in course of formation. A condition was met with in a man of fifty which suggested the likelihood of this occurrence. In this case there was a partial retro-peritoneal hernia of the vermiform appendix into one of the ileo-cæcal fossæ (fig. 23, p. 84), and it was obvious that when the cæcum and ilium were allowed to descend towards the right crural arch the fossa became deeper, and the vermiform appendix nearly disappeared into it. Supposing that the hernia of the vermiform appendix had arisen in this manner, there are two ways in which the cæcum may have descended, and, as it were, drawn the pouch over the appendix. It is well known that during the final stages of the development of the intestines the cæcum achieves its

* "Internal Hernias in the Neighbourhood of the Cæcum," "Cyclopædia of the Practice of Medicine," Ziemssen, vol. vii., p. 549.

position in the iliac fossæ by descending from the region of the liver. The sub-cæcal fossa is formed and deepened during this descent, and has thus a developmental origin; and it is during this process that, as I have just argued, the vermiform appendix may become immersed in the fossa. But the cæcal fossæ may be deepened by a pathological process. It has been abundantly proved that during the formation of hernial sacs there

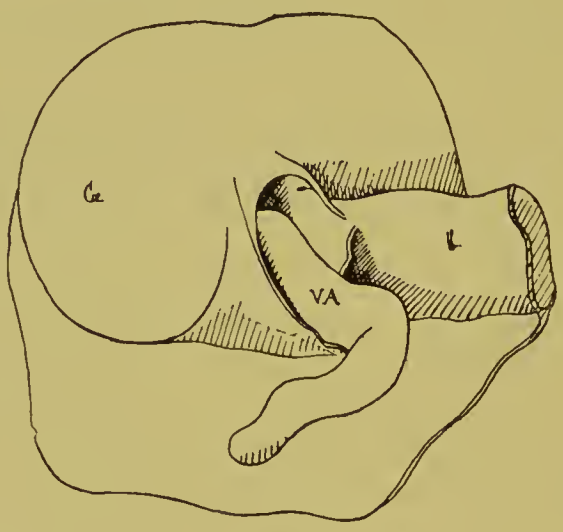


Fig. 23.

Partial Retro-peritoneal Hernia of Vermiform Appendix. Cæ., Cæcum. Il., Ilium. V.A., Vermiform Appendix.

is a downward displacement of the peritoneum which lines the iliac fossæ, and also there is evidence to show that the viscera, namely, the cæcum and the end of the ilium and the sigmoid flexure, are involved in the descent. It is unnecessary to argue how such a pathological process as this would bring about the same results as the developmental process which has just been mentioned.

The Length of the Transverse Mesocolon and Great Omentum, and their Range of Movement.

When these measurements were begun the importance of ascertaining the length and range of movement of the transverse

mesocolon and great omentum was not appreciated, and therefore they were only ascertained in the later cases. So far as concerns inguinal and femoral hernia, the length and height of the transverse mesocolon are unimportant, because they are such as to permit the colon to play an infrequent part in the pathology of those affections. But the height and length of the transverse mesocolon have both a great influence upon the range of movement of the great omentum, and therefore it has to be taken into consideration.

The great omentum is found so frequently in hernial sacs, as is shown by the tables of epiploceles given below, that it may be supposed to have something to do with their formation, but there is very little to show what this influence actually is. That the great omentum frequently finds its way into sacs which have originated without its aid, such as congenital sacs, will be readily allowed; but whether the great omentum does, by its pressure, often cause a sac is another affair altogether. Direct information upon this point is not to be found in works upon hernia. Perhaps the investigation of the transverse mesocolon by proper measurements might assist, but any plan of this sort ought to embrace the height and length of the transverse mesocolon, together with the length and excursion of the great omentum.

The lengths of the transverse mesocolon and great omentum were ascertained in thirty-three instances, and of these twenty were under the age of forty-five. In only one of these the great omentum could be drawn beyond the pubic spine, and in it the omentum reached two inches beyond that point; but in five the omentum reached as far as the pubes. In the remaining thirteen cases beyond forty-five years of age it was the exception rather than the rule to find an omentum which could not be pulled beyond the lower limits of the abdomen. In two subjects, aged sixty and seventy-five respectively, the transverse mesocolon and great omentum together measured seven and eight inches, and had a short excursion; but in the others the great omentum easily passed one, two, or even three inches beyond the spines of the pubes. The exact lengths of the transverse mesocolon and

great omentum are given in the tables at the end of these lectures, and need not be repeated. The general conclusion which can be drawn from the few measurements I have made is in accord with what authors have often stated, namely, that as age advances the great omentum becomes longer and heavier.

With regard to the transverse mesocolon, it is sufficient to say that it resembles the mesentery, inasmuch as it may attain a considerable length, nine inches, for instance, in a subject as young as twenty-three years of age; but that the extreme length is met with later in life, as, for instance, a length of nine and a half inches in a man of sixty-one.

The Height of the Transverse Mesocolon in Subjects without Hernia.

The attachment of the transverse mesocolon to the back of the abdominal cavity is decidedly oblique, being low as it nears the hepatic flexure, and high as it runs towards the spleen. The obliquity may be so great as to make a difference of an inch in the height of the mesocolon, as it crosses the body of the second lumbar vertebræ. The height of the transverse mesocolon was measured in the same way as the height of the flexura duodeno-jejunalis, namely, by measuring its distance from the base line, the rule being laid upon the left side of the bodies of the lumbar vertebræ. Although it is not easy to ensure accuracy, yet it may be said that in most cases the height of the transverse mesocolon corresponds with the height of the flexura duodeno-jejunalis. But differences in height were noted in twenty-two of the hundred cases which were measured; in ten the difference was half an inch, in two three-quarters of an inch, in one an inch, in one an inch and a half, and in one three inches and a half.* The last case was quite exceptional, and as the flexura duodeno-jejunalis was only two inches above the base line, it was probably prolapsed, which would partially account for the separation. The circumstance that all the wide separations occurred after the age of forty seems to point to their being due to an acquired condition.

* Case 56, fig. 12. The subject was a very muscular male, who had very marked genu valgum.

As regards the range of downward movement of the great omentum, it is to be observed that it depended very much indeed upon the degree of distension of the small intestines. This was found to be a source of fallacy which it was difficult to make allowance for.

The Height of the Transverse Mesocolon in Cases with Hernial Sacs.

In six subjects with unquestionable congenital hernial sacs, and the youngest of whom was ten weeks, and the eldest thirty-one years, the height of the transverse mesocolon coincides with that of the flexura duodeno-jejunalis, and it seems probable that this will prove to be the usual condition.

In twenty-five subjects with hernial sacs who were forty years of age and onwards fifteen had a greater or less degree of separation between the transverse mesocolon and the flexura duodena-jejunalis; in seven the interval was half an inch or less, in two three-quarters of an inch, in one an inch, in one an inch and a half; in two it was two inches; and lastly, in one it was two inches and a half (*vide* fig. 20, p. 58).

Thus, in cases of acquired hernia separation between the transverse mesocolon and the flexura duodeno-jejunalis is more frequent than in subjects without hernia, or than in those with congenital hernial sacs. Moreover, when separation does occur in those with acquired hernial sacs the separation is greater than usual, taking all the cases into consideration.

Epiplocele.

The liability to epiplocele is not alike on both sides of the body. Lawrence,* as usual, gives an excellent summary of the various opinions which are held upon this question, and after saying that the great omentum naturally hangs lower on the left side of the abdomen than upon the right, he quotes Arnaud, who gives the proportion of left epiploceles in cases of inguinal and femoral hernia as being nineteen out of twenty; and Macfarlane, that they constitute three-fourths. Inasmuch as a mere external exami-

* *Loc. cit.*, p. 430.

nation of a hernia is of no great value as to the nature of its contents, I have collected from the records of St. Bartholomew's Hospital seventy-nine cases in which during kelotomy the sac was opened and its contents ascertained. The accompanying table shows the relative proportions of each variety:—

	Total.	Gut only.	Omentum only.	Both.
Right—				
Inguinal	16	12	0	4
Femoral	33	18	3	12
	49	30	3	16
Left—				
Inguinal	14	1	5	8
Femoral	16	2	2	12
	30	3	7	20

Thus, taking all the cases together, the great omentum was found nineteen times out of forty-nine on the right side, or very nearly in two-fifths, and twenty-seven times out of thirty on the left side; that is to say, in nine-tenths. But these proportions are perhaps inapplicable to all cases, because entero-epiploceles seem particularly liable to strangulation and other troubles, and would therefore form a larger proportion of the cases operated upon; and it may be remembered that the above table was made from such cases.

Doubtless the predisposition to left epiplocele and entero-epiplocele is explained by the location of the great omentum on the left side of the abdomen. But if we go a step farther, and seek to explain this, the search leads back to the earliest days of embryonic life. It is well known that the great omentum is developed from the mesentery of the stomach, or, as it is usually called, the mesogastrium. The mesogastrium is at first a mesentery of the usual kind, which suspends the stomach to the front of the spine, reaching from the aorta to that which ultimately becomes the greater curve of the stomach (fig. 24). Soon, however, the mesogastrium elongates in a remarkable degree, and makes a considerable bend towards the left side of the abdomen

(fig. 24, M.g.), and downwards towards the left groin. Later it forms connections with the transverse mesocolon, which I have described elsewhere.*

Why the mesogastrium should attain such an enormous size

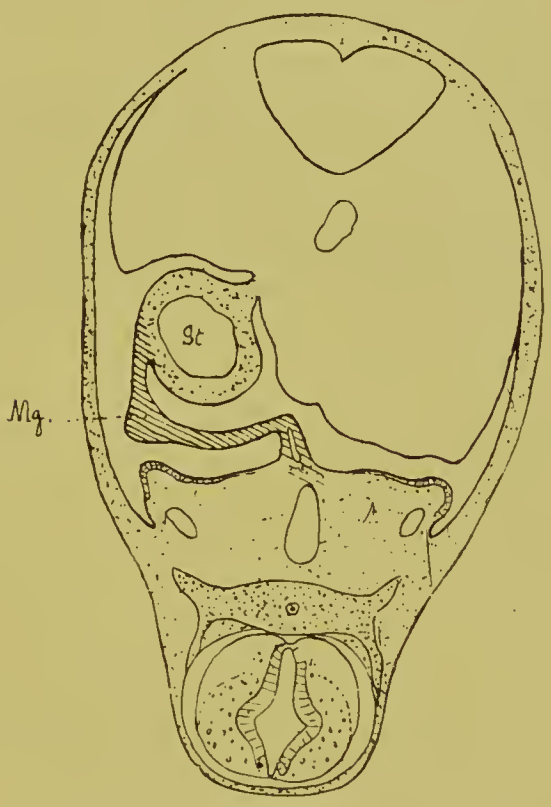


Fig. 24.

Wider Head of Epiplocele. Early Development of the Great Omentum. St., Stomach. Mg., Mesogastrium. The thickening is the beginning of the spleen.

is, I believe, quite unknown. Its deflection to the left is due in some way to the retreat of the liver into the right hypochondriac region, and this in its turn to other causes probably connected with the development of the vascular system; and so we might proceed. However, I have mentioned this

* "The Development of the Great Omentum and Transverse Mesocolon," by C. B. Lockwood, *Journ. Anat. and Phys.*, vol. xviii.

matter because it affords a plausible explanation of an important fact, and because it shows so clearly that the pathology of an organ cannot be appreciated without a knowledge of the history of its development.

The foregoing cases of epiplocele throw hardly any light upon the question whether the great omentum is a cause of hernial protrusions. It is true that amongst the seventy-nine cases there were ten in which the sac contained omentum only. But it by no means follows that the omentum was the original cause of the sac, because it may have originally contained intestine, or a knuckle of intestine may have been overlooked at the time of the operation. My own impression is that the omentum rarely causes a sac, but the whole question is greatly in need of elucidation.

LECTURE III.

The Length of the Mesentery and the Causation of Hernia.

THE measurements of mesenteries given in the previous lectures show that it is hard to estimate the share which the length of the mesentery has in the causation of hernia. But it may at once be conceded that those in whom the mesentery is long are more predisposed to hernia than those in whom it is short; but the evidence in support of this proposition is far from being of a convincing nature. A case of congenital hernia has already been described in which the mesentery was only six-and-a-half inches long, and in which, nevertheless, the patient died of strangulated hernia. Moreover, in the cases of acquired hernia mesenteries four-and-a-half, five, five-and-three-quarters, six, and six-and-a-half inches long were met with, and only one case has been seen, of either congenital or acquired hernia, in which the mesentery exceeded in length the mesenteries of those who had neither hernial sacs nor bulgings of the abdominal wall. Furthermore, many of the subjects devoid of hernia had mesenteries which far exceeded the average length, which, it may be remembered, was seven-and-a-half inches; in them mesenteries whose length was eight, eight-and-a-half, nine, nine-and-a-half, and even ten inches were not infrequent. The only case of hernia in which the mesentery was longer than ten inches, that in which it was eleven inches long, and which has been mentioned before, is not free from doubt, because there is some reason for the belief that the sac was a congenital one of long standing, and that the elongation was an effect, not a cause, of the hernia. Finally, it may be added that no person has been met with during the course of these investigations in whom the mesentery was of such a length as to preclude the possibility of hernia. Therefore, taking all these considerations together, I am unable to attach the same importance to the length of

the mesentery as a factor in the causation of hernia which previous observers have done.

Prolapse of the Mesentery is a Predisposing Cause of Hernia, and not an Effect.

That the abdominal walls afford a great deal of support to the intestines is shown, I think, by a number of circumstances, and amongst others, by the fact that their removal permits an extrusion of the intestines. If this premise be allowed it seems reasonable to argue that when the abdominal walls fail, as they do in acquired hernia, and cease to support the intestines, an excessive strain would fall upon the attachments of the mesentery, and that they would, in consequence of the fault in the abdominal wall, give way and permit the mesentery to become prolapsed.

The weight of evidence, however, seems to point in the opposite direction. For instance, in congenital hernia there is clearly a deficiency in the abdominal wall, but there is no prolapse of the mesentery. Many acquired hernial sacs are likewise unassociated with prolapse of the mesentery. Furthermore, prolapse of the mesentery itself may occur without being accompanied by hernia, as in the following case.

A. J. S., aged seventy-two years, and five feet six and a half inches high, died from complications which accompanied enlargement of the prostate. There was a slight peritoneal depression at either of the femoral rings, but it did not amount to a hernia. The mesentery was nine inches long, and the flexura duodeno-jejunalis and the transverse mesocolon were opposite the base line (see fig. 12, case 96). The downward excursion of the intestines was as follows: The cæcum reached three inches beyond the right crural arch, the ilium three inches beyond the right crural arch, two inches beyond the pubes, and two and a half inches beyond the left crural arch. The prolapse of the mesentery was accompanied, as usual, by prolapse of the hepatic flexure of the colon, which lay opposite the iliac crest; of the right kidney, which was an inch below the iliac crest, but contained an abscess; of the left kidney, which was a finger's breadth above the iliac crest;

and by the prolapse of the transverse mesocolon, which has already been mentioned.

The predisposition to hernia must have been strong in this case, because not only was the mesentery excessively prolapsed, but it was also elongated. The reason for the non-occurrence of hernia was, I believe, the thickness and muscularity of the abdominal walls, which were both in excess of what is usually found in septuagenarians. It is impossible to convey an idea of the strength of the abdominal walls, for want of a recognised standard, and the absence of this requirement has been felt throughout the whole of this inquiry.

The range of the excursion of the intestines was, as might be inferred, greatly increased, and especially towards the left side; and this is quite in keeping with the conclusions arrived at in discussing the mechanism of prolapse of the mesentery.

The association of the prolapse of the mesentery with prolapse of the transverse mesocolon, hepatic flexure of the colon and of the kidneys in this case clearly points to a cause common to them all. The length of the mesentery is also noteworthy, and may betoken the relaxation of tissues which predisposed to the prolapse of the viscera. The exciting cause may have been the expulsive efforts which the long-standing prostatic obstruction entailed. Nor need we admit that the strength and muscularity of the abdominal walls invalidate this argument. It does not follow, because the abdominal walls were strong and muscular, that therefore the peritoneum and suspensory apparatus were equally efficient. I am not aware of any observations to show that in prostatic obstruction there is conservative hypertrophy of the abdominal muscles, but such may be the case. Sir William Lawrence* remarks upon the frequent coincidence of urinary obstruction and hernia. But it remains to be ascertained whether, as this case suggests, a prolapse of the mesentery and of other viscera often accompanies such obstructive affections of the urinary passages.

But these are not all the arguments which can be brought against the view that the fault in the abdominal wall permits the

* *Loc. cit.*, p. 42.

prolapse of the mesentery. For example, there are reasons for supposing that the prolapse precedes the hernia, and that its first effect is to cause bulging of the hypogastric fossæ. Furthermore, although it might be reasonable to attribute the prolapse of the mesentery to the fault in the abdominal wall, yet the other forms of prolapse which are associated with it preclude the possibility. For instance, it seems hard to attribute the oft-accompanying prolapse of the hepatic flexure to the fault in the abdominal wall, or that of the splenic flexure; but more especially is it hard to attribute the accompanying prolapse of the right and sometimes of the left kidney, or the prolapse of the uterus, etc. Indeed, all these point to a more general cause, which will next be mentioned in discussing the other features of the pathology of prolapse of the mesentery.

The Pathology of Prolapse of the Mesentery.

The various affections which are associated with prolapse of the mesentery are a clue to its pathology. Given in the order of their frequency, they are prolapse of the transverse mesocolon, prolapse of the hepatic flexure of the colon, prolapse of the right kidney, prolapse of the splenic flexure of the colon, and prolapse of the left kidney. The pylorus and duodenum are at times also prolapsed, with elongation of the lesser omentum; but a mobile pylorus is such an ordinary occurrence that it hardly deserves to be enumerated amongst the other complications. The co-existence of these affections has just been adduced as an argument to prove that when acquired hernia is associated with prolapse of the mesentery the prolapse is a cause of the hernia, and not an effect; and now it may be argued that their co-existence proves that, with rare exceptions, prolapse of the mesentery is not due to a local and accidental condition, but that there is, except, perhaps, in simple prolapse, a more general deterioration, in which the suspensory apparatus of the mesentery merely participates. The nature of the lesion which permits the displacement of the kidneys* is pointed out by Landau, in his excellent work on moveable kidney.

* "Moveable Kidney in Women," Landau, trans. by F. H. Champneys, New Syd. Soc. Trans., 1884.

In my opinion that author clearly establishes that the prolapse of those organs is due to elongation of the fascia which descends from the diaphragm for their support.* The cases in which I have seen prolapse of the kidneys, either with or without hernia, confirm Landau's views, and also show that the displacement of the kidney is nearly always associated with descent of the hepatic or splenic flexure of the colon.

Analogy would lead us to infer that prolapse of the mesentery was of the same nature as prolapse of the kidney, and was due to a failure in the suspensory apparatus. The question, however, can be placed upon a surer basis, because there is no difficulty in ascertaining that when the mesentery is prolapsed its root becomes excessively moveable and capable of being pulled downwards with significant ease; and moreover, dissection shows that under these circumstances the tissues which compose its root are thin and scattered and inadequate to resist displacement. As we have already seen, the suspensory muscle is one of the chief constituents of the root of the mesentery, and is, I think, mainly at fault. But there are other circumstances, which suggest that the peritoneum ought not to be ignored; for instance, I am not aware that either the hepatic or splenic flexures or the colon, or the transverse mesocolon, have other support than the serous membrane, and yet, as we have seen, prolapse of one or more of those structures is a common accompaniment of prolapse of the mesentery; also when the pylorus is displaced the elongation of the gastro-hepatic ligament is very obvious. All of these circumstances point to the importance of the peritoneum as a factor in these displacements, including that of the mesentery. With regard to the other structures which are involved in this affection, namely, the mesenteric artery, vein, nerves, and lacteals, we can only infer that they play a minor part, although, as in prolapse of the kidney, they are noticeably elongated. The causes of the deterioration of the suspensory apparatuses and peritoneum which permits these various displacements are not clearly indicated by my investigations, but age has without doubt an important influence, and it seems quite

* "Ligamentum suspensorium renis — Englisch."

safe to add other debilitating influences, such as poverty, wasting diseases, certain occupations, and the like.

The Mechanism of Prolapse.

The effects of prolapse of the mesentery might be inferred from the manner in which it occurs. As the root of the mesentery yields it glides down the left side of the bodies of the lower lumbar vertebræ, and allows the intestines to exert unwonted pressure upon the left hypogastric fossæ. From this we might expect that prolapse of the mesentery would especially conduce to left ruptures. Before inquiring whether this inference is borne out by clinical or pathological evidence, it is to be remembered that the right segment of the mesentery normally allows the intestines a greater downward excursion than does the left, and the fact has already been used to explain the greater preponderance of right ruptures, and this preponderance must be taken into consideration in dealing with statistics. It is obvious that the first effect of any increase in the number of left herniæ would merely tend to equalise them with the right. But this assumes that the prolapse is confined to the root of the mesentery, which is not always the case. Although the root may be the first to suffer, the lower attachments are afterwards involved, and the displacement becomes complete. Therefore, although we might assume that prolapse of the mesentery would naturally cause left ruptures, yet, as a matter of fact, double ruptures would prevail; first, because of the commonness of right hernia prior to prolapse; and second, because the descent of the mesentery may be complete, and allow the intestines to descend upon the hypogastric fossæ of both sides.

In the next place, as prolapse of the mesentery seldom occurs before middle age (the youngest case I have seen was in a subject who was said to have been thirty-one years old), we ought not to expect to see its effects upon the statistics of hernia until the later periods of life.

The materials for testing these inferences are given at the end of Mr. Kingdon's memoir, where tables which comprise six thousand cases are presented, and have already been utilised in

the construction of the chart to show the percentage of single right ruptures at different periods of life (fig. 15, p. 44).

Taking first those cases which had rupture on the left side only, it is clear (fig. 25) that their proportion remains almost constant until between the ages of thirty-five and forty, when they are just over twenty-five per cent. of the total number; between forty and forty-five they suddenly increase to thirty-five per cent., and as suddenly decline; so that between forty-five and fifty they are only twenty per cent. of the whole; and this percentage is maintained with remarkable steadiness until the close of life.

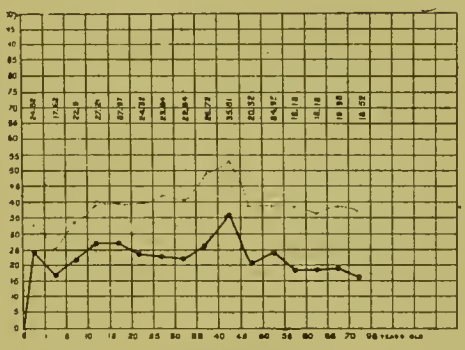


Fig. 25.

Scheme made from Mr. Kingdon's Tables, to show the Percentage of Single Left Herniæ at different Periods of Life. The faintly marked Line shows the Total Percentage of Left Herniæ.

The sudden increase in the proportion of left ruptures between the ages of thirty-five and forty-five is partially explained when we call to mind that at that time of life the pelvic peritoneum is relaxed in the female, that the mesentery may be prolapsed, and is as long as it is ever likely to become. Under these circumstances it might be surmised that the left side, which does not seem under normal conditions to be so much pressed upon by the intestines as the right, and is therefore less resistant, would yield when these factors came into play.

The fall in the percentage of single left herniæ which occurs between forty-five and fifty is apparent rather than real. If now we

turn to the chart (fig. 26) which shows the proportion of double ruptures we shall see that the fall which the percentage of single left herniæ undergoes between forty-five and fifty is compensated for by an equally large and simultaneous increase in the percentage of double ruptures. Indeed, although between the ages of forty-five and fifty single left herniæ are only twenty per cent. of the whole number, yet very nearly fifty per cent. have double herniæ, and the remaining thirty per cent. single right herniæ.

If the total percentage of right herniæ and the total percentage of left herniæ be worked out and compared it will be found at

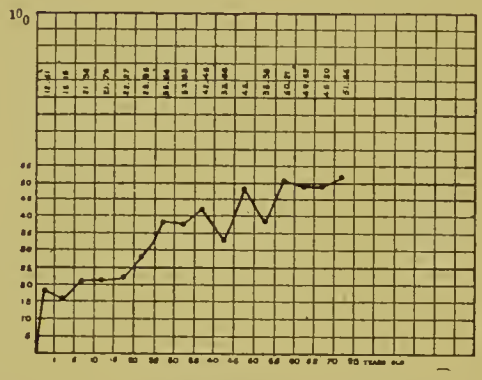


Fig. 26.

Scheme made from Mr. Kingdon's Tables, to show the Percentage of Double Herniæ at different Periods of Life.

the age of forty the proportion is exactly equal, each being close upon thirty-three per cent.; between forty and forty-five the left exceed the right; and between forty-five and fifty the right comprise just over fifty-five per cent., and the left just under forty-five, and this proportion is maintained until the close of life.

The percentage chart of double ruptures is also very instructive. Until the age of twenty their proportion remains steady at just over twenty-one per cent.; then it rapidly increases, until at thirty years of age it amounts to thirty-eight per cent., and by forty years of age to forty-two per cent.; it falls again

between forty and forty-five, owing to the increase in the number of single left herniæ, but afterwards runs up to fifty per cent., which proportion is maintained until the close of life.

Nearly all the cases of prolapse of the mesentery which have been referred to in the second lecture prove the correctness of the assumption that that affection increases the excursion of the intestines over the left crural arch. The following is a case in point, and it further shows that prolapse of the mesentery is not necessarily accompanied by an equal prolapse of the transverse mesocolon, but that that structure may nearly retain its proper height.

Oblique Scrotal Hernia of the Left Side, containing Sigmoid Flexure and Jejunum, associated with Prolapse of the Mesentery—Age Eighty-five.

The following is the case of a man of the advanced age of eighty-five years, and five feet four and a half inches high, who had had a hernia on the left side for many years; this became strangulated, but he refused operation until too late, and he ultimately died of fæcal extravasation. The hernial sac was large, with a capacious mouth, encircled on its inner side by the deep epigastric artery; it had none of the characters of a congenital sac, and contained two feet of sigmoid flexure, attached by its mesentery to the back of the sac, and a large loop of jejunum, which latter was gangrenous. The mesentery, including the width of the gut, was eight inches long, and its commencement at the flexura duodeno-jejunalis was half an inch above the base line; the transverse mesocolon was attached two and a half inches above the same landmark. The range of the small intestines was increased, so that the ilium reached three inches beyond the right crural arch, and the lower part of the jejunum lay in the hernial sac, some distance below the pubic crest. The hypogastric fossæ of the right side did not bulge.

I regret that the notes of this case are so defective, but they were taken before the importance of some of the details had been appreciated. There is no direct evidence to show whether the sac owed its origin to the jejunum or to the sigmoid flexure, but

we need not hesitate in concluding that the presence of the jejunum within the sac would have been impossible without the prolapse of the mesentery. The same applies to the sigmoid flexure, for its mesentery was also prolapsed; but here again it is uncertain whether this was due to the displacement of the peritoneum during the formation of the sac by the pressure of the jejunum, or whether it was part of a general condition.

The Diagnosis of Prolapse of the Mesentery.

The foregoing cases seem to show that prolapse of the mesentery may occur either with or without hernia. If we begin with the last alternative, the one which is least likely to come within the province of the surgeon, it may be said that its diagnosis depends upon alterations in the shape of the abdomen, the presence or absence of other forms of prolapse, and upon the age of the patient. When hernia is associated with prolapse of the mesentery the diagnosis still depends upon the same conditions, and also upon the characters of the accompanying hernia.

The Diagnosis of Prolapse of the Mesentery. Shape of the Abdomen.

It has long been recognised that in acquired hernia the shape of the abdomen is altered. Malgaigne,* to whose labours I have so frequently referred in these lectures, speaks of it, and asks, strangely enough, it seems to me, whether it may not be a predisposing cause of hernia. Further, this author describes four different kinds of abdomen which may be observed in patients with ruptures, namely, flat, slightly protuberant, excessively protuberant, and a peculiar form with "triple bulging." It is not my intention to do more than mention these varieties, except the last, which is, I believe, of diagnostic importance. According to Malgaigne, it "is characterised by a median bulging corresponding to the white line and recti muscles, and by two lateral bulgings which correspond with the oblique muscles. The latter seem to have yielded, and to have become relaxed so as to form a kind of *cul-de-sac* or pocket near the iliac crests, and in these pockets the intestinal mass reposes." † Owing to the kindness and

* *Loc. cit.*, p. 45. † *Loc. cit.*, p. 45.

generosity of my friend Mr. Macready, I am able to reproduce the photograph of a man which not only shows the iliac bulgings which Malgaigne describes, but also illustrates a peculiarity which he omits to mention. This consists, as may be seen in

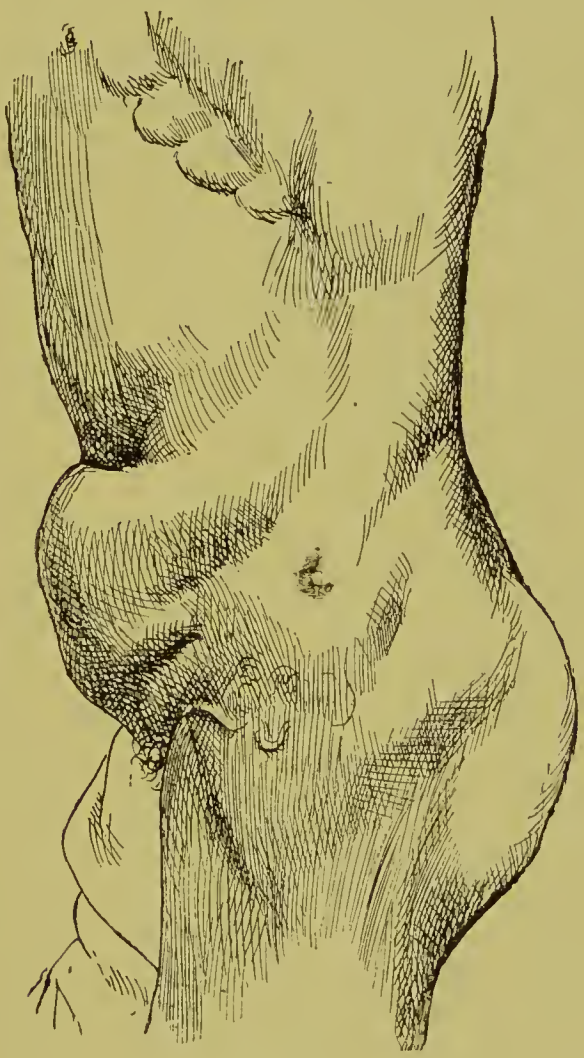


Fig. 27.

Shape of the Abdomen in Prolapse of the Mesentery. Drawn by Mr. Swainson, from a photograph kindly lent by Mr. Macready. The patient had a large scrotal hernia of the left side.

Mr. Macready's photograph, in a sinking in of the upper part of the abdomen, and a projection of the lower (fig. 27). It is almost impossible after death and with the body recumbent to discern this condition, but in the case operated on by Mr. Bruce Clarke its

association with prolapse of the mesentery was ascertained, and it was proved to be diagnostic of prolapse of the mesentery (p.130).

The photograph which I have just referred to is evidently taken from an exaggerated case, but when once the import of this diagnostic sign is appreciated its minor degrees will be sought for and recognised. With regard to the other varieties of shape of the abdomen mentioned by Malgaigne, namely, the flat, slightly protuberant, and excessively protuberant, he shows * that out of two hundred and thirty ruptured individuals, one hundred and fifty-three had flat abdomens, thirteen protuberant, and fifteen abdomens with triple bulging. These figures are deprived of value, because there is no record of the variety of hernia which may have been associated with any particular shape. However, the figures are what might be expected when we remember that high degrees of prolapse are not common, whilst, on the other hand, every one, whether ruptured or not, must have either a flat or bulging abdomen.

In many of the cases of prolapse of the mesentery given in these lectures there was an accompanying prolapse of the transverse mesocolon, hepatic and splenic flexures of the colon and of the kidneys; other forms of prolapse may have existed, particularly of the uterus; but in the earlier examinations these latter were not sought for, and in the later ones the conclusion was arrived at that even had they been present their detection, under the circumstances, would have been difficult. With our present knowledge it would be very hard, perhaps impossible, to diagnose during life some of the visceral displacements which are associated with prolapse of the mesentery, such, for instance, as that of the transverse mesocolon, hepatic and splenic flexures of the colon and of the duodenum; but the same does not apply to the displacements of the kidney, and an endeavour should be made in acquired hernia to ascertain whether those organs are or are not displaced. It is quite unnecessary to point out how this should be done, or to say anything further concerning the question of prolapse of the uterus, vagina, bladder, or rectum.

The age of the patient has also to be taken into consideration

* *Loc. cit.*, p. 45.

in diagnosing prolapse of the mesentery. The youngest subject in whom I have found this condition was thirty-one years of age, and in it the flexura duodeno-jejunalis was an inch and a quarter above the base line, and there was also prolapse of the transverse mesocolon. But as thirty-one is such a comparatively early age for any form of prolapse to occur, this instance is probably an exceptional one. The age of the next youngest subject with prolapse of the mesentery was forty-nine, and although the age of some of the cases was doubtful, it is questionable whether any of them were younger than those which have just been mentioned (*vide* fig. 20, p. 58, Lect. II.).

In cases of hernia the question of the presence or absence of prolapse of the mesentery also turns upon the history and characters of the hernial swelling. As we have already seen, the acquired varieties of hernia are especially associated with prolapse of the mesentery. It seems highly probable that the small femoral herniæ which occur in young women during the period of child-bearing are due to a local relaxation of the peritoneum, and are unaccompanied by prolapse or other fault of the mesentery; but beyond these there are numerous cases of femoral hernia which are associated with prolapse of the mesentery and of other organs, and these may be discriminated by means of the general principles already laid down. Congenital femoral hernia is so exceedingly rare that it need not be taken into consideration. With regard to inguinal hernia, the diagnosis between congenital and acquired hernia can usually be established, and it is only necessary to mention the indications for their differentiation. The age at which either variety occurs need not be further dwelt upon; the manner of their appearance is significant. The congenital hernia, which descends into an already formed sac, is sudden in its onset, and apt to be strangulated; the acquired herniæ, which as they increase, form a sac for themselves, come slowly and by degrees, and the tumours appear simultaneously on each side of the body, or within a short time of one another. An obvious cause for the appearance of the rupture is so hard to find that they are usually called "spontaneous." Malgaigne * says

* "Leçons Clinique," p. 53 *et s.*

they appear late in life, and adds that their onset is slow and gradual, and if not double from the commencement, they have a remarkable tendency to become so. Indeed, that author remarks very significantly that "when one hernia exists it predisposes to another; and why, we cannot tell." The occurrence of the pathological change which I have ventured to call prolapse of the mesentery affords an explanation of these cases.

In the diagnosis of acquired and congenital hernia there are some other and perhaps minor points which ought to be taken into consideration, such as the presence or absence of bulging of the opposite hypogastric fossæ when one hernia is present,* the relation of the gut to the testicle, the direction of the axis of the hernial swelling, its relation to the spermatic cord, the manner of its reduction, and lastly the condition left after reduction. Inasmuch as these various points are fully described in the surgical text-books, further allusion to them is not required.

The statement has already been made in these lectures that no one is free from the possibility of rupture, and therefore it seems likely that in many of those cases of young subjects in whom a hernia follows strains and exertion there is no prolapse of the mesentery or extraordinary excursion of the intestines, but only a traumatic lesion in the abdominal wall, capable of repair; a number of these are in reality congenital in their nature, the term being used in an anatomical sense.

The Selection of Cases for the Operation for the Cure of Hernia.

One of the objects of these lectures has been to ascertain, on anatomical and pathological grounds, the cases of hernia which afford a prospect of being benefited by proper curative operations. No operation can be called a cure which does not enable the patient to dispense with a truss, and no operation upon an inguinal hernia is likely to achieve this result which has not for its aim (1) the obliteration of the hernial sac without leaving a peri-

* It sometimes happens, as might be expected, if prolapse of the mesentery is as common as it seems to be, that when an acquired hernia is reduced and kept up with a truss a rupture forms at a fresh place.

toneal depression, (2) the restoration of the valve form of the inguinal canal, and (3) the restoration of the internal and external abdominal rings. Operations which fail entirely in these particulars are often classed as curative operations, and their failure brings the proper procedure into disrepute. In femoral and umbilical hernia similar principles apply, with the qualifications which are necessary to meet their special requirements.

Lucas-Championnière,* on grounds of expediency, gives the following list of cases of hernia which seem especially marked out for curative operations. It includes irreducible herniæ; intractible herniæ; congenital herniæ with retained testicle; painful herniæ; herniæ associated with certain affections, such as asthma and emphysema; certain social conveniences; and lastly, herniæ liable to obstruction. Without waiting to discuss the expediency of operating under these various conditions, I propose to proceed with the anatomical and pathological questions which underlie them all, and upon which the promise of a permanent cure rests.

It may be said at once that upon anatomical and pathological grounds congenital herniæ are the most suitable for curative operations. In these, as we have already seen, there is neither prolapse nor elongation of the mesentery, and the fault is a development deficiency in the abdominal wall. But it must be added that operations for their cure are rather more likely to be successful after growth has ceased, because the mesentery is longer, and the bowels protrude farther, during infancy, childhood, and early adolescence. For instance, the length of the mesentery was a fifth of the length of the body during infancy, a seventh from the age of two years to ten, an eighth from ten to twenty, and afterwards a ninth; and the downward excursion of the intestines was in proportion. After the age of forty-five operations for the cure of congenital hernia are less to be commended, because, as the statistics show, that age seems to mark a turning-point in the history of hernia. At forty-five the relative percentage of right, left, and double herniæ is remarkably equal. Afterwards there is a marked increase in double herniæ, a cir-

* "Cure Radicale des Hernies," 1887, p. 20.

cumstance which has just been attributed to prolapse of the mesentery and the conditions which accompany it.

There is a further reason why infancy, childhood, and early adolescence are not altogether the best times for curative operations, because, as Chelius says, there is during those periods of life a good prospect of a cure by other means, especially by the continuous wearing of a truss.* In his article on "Trusses," in Heath's "Dictionary of Surgery," Mr. John Langton † says that in six years 6,268 boys up to the age of five years were supplied with trusses at the City of London Truss Society, while only 1,174 were relieved between the ages of eleven and fifteen years. This decrease is much more than can be accounted for by reference to the question of death-rate or Registrar-General's returns. Mr. Lewis Marshall ‡ mentions forty-one cases of infants treated with the worsted truss, of whom twenty seemed to have been cured, although nothing could be ascertained about nine others.

The above-mentioned disproportionate growth of the mesentery affords an explanation of this tendency towards recovery, and doubtless the cure is helped by an actual closure of the processus vaginalis. In order that this closure may take place it is obvious that the hernia must be reduced and retained; and when this condition has been fulfilled the normal closure of the processus vaginalis, which has only been delayed, is able to occur; and it is obvious that the obliteration will be aided by the pressure of a truss.§ Were it necessary, cases could easily be collected to show the frequency of this kind of cure, but they are within the experience of every surgeon, and the fact is so well recognised that it is needless to do so. Should a congenital hernia prove at all intractable, and not be cured by a truss, a curative operation should, I think, be strongly commended to the patient. To some the mere wearing of a truss is irksome, and there is always the liability of the instrument failing during exertion; to these an operation as safe and efficacious as the aseptic operation to be

* "A System of Surgery," by Chelius, trans. by South, vol. ii., p. 65.

† Heath's "Dictionary of Practical Surgery," vol. ii., p. 664.

‡ Lewis Marshall, *British Medical Journal*, May 19th, 1888.

§ See Sp. 2,089, St. Bartholomew's Hospital Museum.

shortly described will be welcome. Further, herniated people who wish to enter the public services—army, navy, or police—may reasonably submit to operation if the diagnosis has localised the fault in the abdominal wall, and not in the suspensory apparatus of the intestines.

Thus, anatomical and pathological data confirm the opinion of Mr. Birkett,* who, on *à priori* grounds, selected congenital hernia as being the most fitted for the operation of radical cure. Also Mr. John Wood, whose clinical experience has been so wide, has in his various writings expressed almost the same opinion.† Mr. Bryant, likewise, writes that there is a better basis for the practice of radical cure in cases of congenital hernia,‡ and it seems reasonable to include those herniæ of young subjects which follow strains and over-exertion.

In the second of these lectures the acquired herniæ were divided into three classes—1, those in which there was neither prolapse nor elongation of the mesentery, and in which the fault was presumably in the abdominal wall; 2, those in which there was simple prolapse of the mesentery; 3, those in which there was complicated prolapse of the mesentery. None of these classes of acquired hernia afford such a prospect of cure by operation as the cases of congenital hernia, but the prognosis is not the same in every class. Those in which there is neither prolapse nor elongation of the mesentery are by no means unfavourable. Only three cases have been recorded under this heading—two women, aged twenty-four and forty-six years, and a man aged fifty-six, and they all had femoral herniæ. Of course definite conclusions cannot be drawn from such insufficient data, but I am inclined to think that those cases of femoral hernia which occur in young women and during the child-bearing period belong to this class, and that the well-known relaxation of their pelvic peritoneum is the predisposing cause of their herniæ. I have operated upon several of this class for the relief of troubles connected with their herniæ, but London cases are so hard to

* *Loc. cit.*, p. 670.

† *E.g.*, "On Rupture," p. 8.

‡ "The Practice of Surgery," 3rd ed., 1879, p. 680.

trace that the ultimate results cannot be told. The last was operated upon more than six months ago, and I am informed by Mr. Blott, whose patient she was, that there is no return, although no truss has been worn.

The second class of acquired hernia, those with simple prolapse of the mesentery, are by no means fitted for curative operations performed upon the abdominal walls. Such procedures fail to deal with the cause of the disease, and seem doomed to failure. This applies with special force to complicated prolapse of the mesentery, in which the pathological conditions are particularly unfavourable. These two classes of acquired hernia are best dealt with by palliative measures, except under the most special circumstances.

The above does not apply to cases of acquired hernia which have had to be operated upon for the relief of strangulation. Before an operation of that kind is ended an endeavour should be made to repair the abdominal wall. Not because the additional operation is likely to afford a lasting cure and dispense with a truss, but because, without adding to the danger, it enables a truss to be worn with greater ease and safety. Of course, as once occurred to myself, the patient with strangulation may be too ill to bear the additional procedure, and it has to be abandoned.

Further, it is sometimes necessary to operate upon cases of acquired hernia with simple or complicated prolapse of the mesentery, because the gut or omentum is irreducible and painful, or on account of repeated attacks of obstruction. Under these circumstances the operation should only be undertaken as a preliminary to the wearing of a truss.

Operation for the Cure of Hernia.

It is not incumbent upon the advocates of an operation to prove its perfection; it is sufficient to show that the prospective advanvantages surpass the dangers or disadvantages. I propose to speak of the dangers and disadvantages first, and endeavour to point out how they may be obviated. They include three main

things—first, the mortality; second, the danger of atrophy or sloughing of the testicle; and third, the danger of relapse.

The Mortality of Operations for the Cure of Hernia.

Operations for the cure of hernia have of late been done on two sorts of cases, which, so far as concerns their mortality, clearly ought to be kept apart. One class includes the non-strangulated herniæ, and the other those in which the operation has been done as a supplement to kelotomy. It may be supposed that unless there was some very strong contra-indication, no surgeon considers kelotomy complete without having attempted to close the hernial aperture. I do not at present intend to discuss the details of the operations which should be performed for this purpose, inasmuch as they do not differ essentially from those which will be mentioned later on as being applicable to non-strangulated cases. The superaddition of this curative measure to kelotomy may certainly be said not to have enhanced its dangers, which, owing to the procrastination of practitioners, are so excessive. However, it must be evident that the mortality in this class of cases will always be to some extent beyond the control of the surgeon, and moreover, as many of the patients have prolapse of the mesentery and its accompaniments, relapse of the hernia will be a frequent occurrence.

Doubtless operations for the cure of non-strangulated hernia have failed to establish themselves in popular favour because, as I believe, they have not been based upon clear and precise knowledge of the pathology of the disease which they are intended to relieve. The absence of this knowledge has hitherto restricted my own operations to cases in which there was some reason for interference, such as adherent omentum or gut, inability to wear a truss, recurring attacks of obstruction, or because the patient wished to enter one of the public services—the army, navy, police, etc. Therefore, to obtain information as to the mortality of operations for the cure of hernia I have been obliged to draw upon the experience of others, and in mentioning these it

is convenient to take both the strangulated and the non-strangulated classes together.

How small the mortality may be under favourable circumstances is shown by Dr. Macewen's tables,* wherein are recorded eighty operations without a death. Fifty-one of these were performed for the cure of non-strangulated hernia, and the average age of the forty-three patients was a little less than twenty-four years.† Twenty-nine were performed after strangulation, and the average age of these patients was thirty-seven years, but of course this class does not permit of selection like the other. These averages clearly indicate one of the roads towards success, and bear out the conclusions which the pathological data afford.

In Mr. Banks's statistics fifty-nine operations on non-strangulated hernia are given, with two deaths. A child two years old died in seven hours from shock, and an ataxic man, forty-seven years old, died in a fortnight from some doubtful cause unconnected with the wound. These misfortunes call for no comment. Mr. Banks also operated upon sixteen very large or enormous hernia, of whom four died—two from septicæmia, one from unsuspected abscess, which burst into the peritoneum after the patient had begun to walk about, and in another case the operation had to be abandoned. Moreover, of twenty-two cases of strangulated inguinal hernia one, an old man of seventy-seven, died from septicæmia and bronchitis. Of nineteen cases of strangulated femoral hernia two died, but one of these was collapsed and the other moribund when admitted.

Cohn‡ enumerates fifty-one operations for the cure of hernia, with one death, which was due to septicæmia. Mr. Mayo Robson§ had two deaths in twenty-six cases of strangulated and non-strangulated hernia, the deaths occurring in the former class.‖ Socin, of Basle, tabulates 136 operations, seventy-one being in strangulated, the rest in non-strangulated

* *Loc. cit.*, p. 1266 *et s.*

† Several of the patients had both sides operated on.

‡ Cohn, *Berlin klin. Wochenschrift*, No. 32, 1888, p. 643, "Zur Tecknik der Radical Operation," etc.

§ *British Medical Journal*, Dec. 10th, 1887.

‖ "The Operations of Surgery," p. 646.

cases, and these, as Mr. Jacobson says,* gave a mortality of 3·6 per cent. But I cannot help thinking that this does not represent the true mortality in all cases, because I myself know of three fatalities which, so far as can be ascertained, have never been published, and doubtless there are others. Five per cent. is perhaps a safer estimate. Mr. Barker† says he has performed an operation of his own and allied operations for the radical cure of hernia, "without a single untoward result" in over forty cases. But elsewhere this author‡ says three required a second operation on account of return of the rupture, and in another case there was free suppuration.

The latest statistics of mortality given by Mr. John Wood are to be found in his article on "The Radical Cure of Hernia," in Heath's "Dictionary of Surgery."§ His own operation resulted in about twenty per cent. of failures and two deaths in 240 cases. However, he mentioned thirty cases of inguinal hernia treated by the open method, with three deaths, and eleven cases of strangulated inguinal hernia, with one death. He also speaks of "twenty cases of crural hernia, fourteen of which were cases of strangulated, and three of irreducible hernia, with one death and one failure." We may suppose that the other three cases, which are unaccounted for, were non-strangulated and reducible herniæ. Mr. Wood gives a very high estimate of the dangers of the open method. He quotes M. Tillanus, who gives eleven per cent. of deaths, and says that he himself concludes that twelve per cent. would be the average. This mortality, we may infer, includes all sorts of cases, strangulated and non-strangulated.

Dr. J. Lucas-Championnière‖ has just published an excellent series of successful operations by the open method; in favourable cases he estimates the mortality at one in four hundred, and in less favourable, but non-strangulated, cases at four in a hundred.

These examples seem to afford a fair idea of what the mortality

* "The Operations of Surgery," p. 646.

† "A Manual of Surgical Operations," p. 338.

‡ *British Medical Journal*, Dec. 3rd, 1887, p. 1204.

§ Vol. i., p. 693 *et s.*

‖ "Etude sur la Cure Radicale de la Hernie non Etranglée avec un Statisque de Cent vingt Opérations," Paris, 1889, p. 4.

of operations for the cure of hernia has been, but it is reasonable to suppose that as our knowledge of the pathology of hernia extends success will be greater. The curative operation is still in its infancy, and has in the past been often performed under unfavourable circumstances and upon patients with prolapse of the mesentery and of other organs, and whose tissues were deteriorated. Moreover, it is to be expected that as our knowledge of the pathology of septic and infective diseases of wounds improves, and as we acquire further means of preventing them, a further fall in the rate of mortality will be witnessed. These are the main conditions upon which the success of any operation depends, namely, a due appreciation of the morbid anatomy and pathology of the affection which it is intended to remedy, and the prevention of septic and infective diseases.

Relapse after Operations for the Cure of Hernia.

Relapse after operations for the cure of hernia must necessarily depend upon a number of circumstances, but above all upon the pathological condition of the patient at the time of operation. These investigations clearly show that cases of congenital hernia afford the best prospect of a lasting cure. But before inquiring whether this be so, let it be understood that hernia operations ought to be judged the same as others, and therefore the special features of each case ought to be taken into consideration. For instance, in congenital hernia the fault is in the abdominal wall, and in a *recent* case there is no prolapse or elongation of the mesentery, nor increased excursion of the intestines; moreover, except under unusual circumstances, the aperture in the abdominal wall is small, and the length and obliquity of the inguinal canal are maintained. Such cases as these afford a very strong prospect of a durable result, and ought not to be placed in the same category as long-standing and neglected cases of congenital hernia, in which the aperture in the abdominal wall has been allowed to become enlarged and open straight into the abdomen, the inguinal canal having disappeared. These disadvantages are grave enough, but perhaps others ought to be added, because neglect

may have induced a local elongation of the mesentery, and prolapse is possible as age advances. From Dr. Macewen's tables I gather that out of fifty-one operations on forty-three patients, there were only two of the non-strangulated cases who had subsequently to wear a pad, and one of them only did so whilst at his work, which was that of a blacksmith.* But, be it noted, the age of this man was forty years, and he had had a hernia many years. The average age of Dr. Macewen's non-strangulated cases was a little less than twenty-four years, and this is, I think, an important factor in his brilliant results.

Mr. Mitchell Banks† traced seventy-seven cases of strangulated and non-strangulated hernia upon which he performed an operation for permanent cure, and of these forty-eight remained quite sound, seventeen were partial successes, and twelve complete failures. The average age of fifty-eight non-strangulated cases of inguinal and femoral hernia operated upon by Mr. Banks was more than thirty-six years, and this, I have no doubt, explains the smaller proportion of his successes; the average age of thirteen partial successes or total failures was forty years. However, a glance at the tables shows that these were put to extraordinarily severe tests, their work being of the most rigorous kind.‡

That the method of operating will have a great influence upon the durability of the cure will be at once admitted. As I have already said, the essential features of a satisfactory operation are (1) that it should completely obliterate the sac and leave no peritoneal depression; (2) that it should restore the inguinal rings; (3) that it should restore the valve-like character of the inguinal canal. It is not my intention to discuss the details of the various measures by which these desiderata are usually obtained. Later on, in alluding to the steps of the operation for the cure of hernia, the steps are mentioned by which a satisfactory result can be ensured with the smallest risk.

* *Loc. cit.*, p. 1267, table 1, case 42.

† Statistics given before the Harveian Society.

‡ See also paragraph on Statistics of Radical Cure, Lecture I.

Atrophy and Sloughing of the Testicle.

The literature of operations for the cure of hernia hardly mentions such an after consequence as sloughing or atrophy of the testicle, but nevertheless I have reason to know that these dangers are by no means imaginary. The nutrition of the testicle may be disturbed by a number of accidents, such as injury of the vas deferens, injury of the spermatic artery or veins, or by inflammatory processes following the operation.

The spermatic vessels may be injured in several ways; for instance, the artery may be cut in two, or the veins may be so badly bruised and lacerated that phlebitis and obliteration supervene, or both arteries and veins and the other constituents of the cord may be strangulated by the ligatures which close the hernial apertures.

In ordinary cases these accidents can be avoided. The constituents of the cord lie behind the sac, in definite relation both with it and with one another;* but in long-standing cases, as Scarpa † and others have pointed out, their relations are so much disturbed by the effects of pressure that their position may be upon either the front, back, or sides of the sac, and they may be divided in the first incision. This question is of such importance that, towards the close of these lectures, I propose to say something upon it, in speaking about the structure of hernial sacs. However, it may not be amiss to say forthwith that, as a preliminary to all operations upon inguinal hernias occurring in males, an attempt should be made to feel the position of the constituents of the spermatic cord, and failing this the greatest care should be taken in cutting down upon and in incising the sac.

Those operations which necessitate the separation of the sac and its conversion into a pad, by twisting or otherwise, have strong recommendations, but they seem to entail so much disturbance that it would be interesting to know the ultimate condition of the testicle after they have been performed. The separation and folding of the sac have been recommended by Dr. Macewen,‡

* See also Lecture III.

† *Loc. cit.*, p. 70.

‡ *Loc. cit.*, p. 1269.

but he states that it is ill suited for congenital hernia, and describes a special method of dealing with them, which will be mentioned later. Dr. Ball* has been the chief advocate of the twisting operation, but out of twenty-two cases operated upon by this surgeon no less than four had scrotal abscess. The actual cause of this is not mentioned, but the account given of the operation leads one to infer that there was great disturbance of the scrotal connections of the sac, and also that there could not have been complete asepsis, the latter, of course, being hard to obtain in wounds which involve the scrotum. Nothing is said about the ultimate condition of the testes.

Operations for the Cure of Hernia—Radical Cure.

It would take a long time to give a mere list of the operations which have been planned for the cure of hernia.† Although a number of methods are in every-day use, it cannot be said that any particular one holds the field. This is due, no doubt, to the uncertainty of the results which, as I have said elsewhere, depend upon the non-discrimination of suitable cases and upon the incompleteness with which operations are performed. Owing to the proportion of failures, fresh attempts are constantly being made to devise more perfect operations upon the abdominal wall. But it is clear that until the pathology of hernia is placed upon a better basis each operation for the so-called radical cure of hernia must be an empirical experiment, and as likely to retard as to advance the progress of surgery.

Speaking first of operations done upon the abdominal walls, the evidence is, I think, in favour of an open operation. With modern precautions an open wound has lost most of its terrors, and it permits of an efficient operation being performed. There is reason to repeat Sir William Lawrence's remark, that "we

* "Radical Cure of Hernia by Torsion of the Sac," *Brit. Med. Journ.*, Dec. 10th, 1887, p. 1272.

† Mr. Jacobson gives an excellent account of the open method, the subcutaneous method, and the method by injection of astringents (*loc. cit.*, p. 645 *et s.*).

cannot reasonably expect that the mere closing of a sac will form a sufficient obstacle to a fresh protrusion," * because this is not infrequently done, without the hernial apertures receiving any attention, and the imperfect operation is afterwards called a "radical cure."

I do not propose to give the time at my disposal to a review of the extraordinary number of operations which have been advocated for the cure of hernia. Some have been practised for many years, forgotten, and then reinvented. Perhaps it will suffice if I briefly mention some of the main points in an ordinary open operation.

The practice of surgeons is different as regards the management of cases, but the following refers to such precautions as I myself adopt for these and other operations.

Considering the circumstances under which a general surgeon does his work; that all kinds of cases, septic and otherwise, may be admitted into his wards; that the house-surgeon, sisters, and nurses are brought in contact with septic and infected cases, is seems safest that antisepsis should be practised.

A sterile and aseptic wound is the end and aim of all precautions, and each operation is, therefore, a severe test of the perfection of the method which is employed.

It is unnecessary to dwell upon the means which are at present available for the attainment of asepsis. Wounds which contain microbes may be antiseptic, but are not aseptic. As a preliminary the surgeon and assistants trim their nails as close as possible, and after repeated washing and scrubbing, soak the hands and arms in solution of perchloride of mercury, 1 in 1,000 strength. Care is taken to see that the sisters and nurses are duly prepared and understand their responsibilities. All the instruments and sponges are specially prepared; the instruments with long immersion in boiling water and freshly prepared carbolic lotion, strength 1 in 20; the sponges by being boiled and prepared in the way that Mr. Thornton recommends for ovariotomy, and kept during the operation rinsed in boiling water and in solution of perchloride of mercury, strength 1 in 1,500. The preparation of the

* *Loc. cit.*, p. 118.

patient is, of course, as important as all the rest. Assuming that the organs have been duly examined, the patient is kept in bed for at least forty-eight hours before the operation, and a purge is administered. The night before the operation a warm bath is given, and the site of the operation prepared by being washed, scrubbed, shaved, cleansed with turpentine if necessary, soaked with 1 in 1,000 perchloride of mercury lotion, and enveloped in an alembroth dressing. Twisted silk is easy to obtain, and when it has been boiled in 1 in 20 carbolic acid lotion for half an hour, and kept in freshly made lotion of the same strength, makes good and reliable sutures for every stage of the operation. Chromicised, catgut is also suitable, but it is not so easy to obtain of reliable quality. Kangaroo tendon has also many advantages, but asepsis seems less certain when these animal ligatures are used. Ordinary catgut, such as is obtained from instrument-makers, is in my experience, most unreliable. The wire sutures which some operators use have led to accidents, and as other material is available which is just as reliable, its use is not to be recommended.

In performing the operation the skin incision is kept, both in inguinal and femoral hernia, well away from the fold of the scrotum or labium. Bleeding is stopped with pressure forceps, and any form of catgut ligature is applied with reluctance, on account of its unreliability.

The aponeurosis of the external oblique should not be divided, for the external ring and the inguinal canal, after having been occupied by the hernia, admit the finger sufficiently to permit the sutures being passed with a suitable needle, such, for instance, as Dr. Macewen's (*vide* fig. 28, p. 122). But if the size of the external ring is any bar to a perfectly efficient closure of the internal abdominal ring, and to a restoration of the hinder wall of the inguinal canal, the external oblique aponeurosis may be divided to a sufficient extent. The treatment of the sac depends a good deal upon the variety to which it belongs. The sacs of acquired inguinal and femoral herniæ often have thin walls, and are separable from their surroundings. Therefore, since the object of this part of the operation is to obliterate the mouth of the sac and prevent a peritoneal depression,

its neck should be freed from its connections with the abdominal walls and from the margins of the internal abdominal ring, drawn down, and ligatured; or it may be folded up and converted into a pad.

The drawing down and freeing of the neck of the sac serves two purposes; it enables the whole sac to be removed without leaving a peritoneal depression, and diminishes the loose peritoneum which might otherwise remain at the vicinity of the mouth of the sac. But care must be taken in performing this part of the operation. A little while since I assisted a colleague to operate upon an old woman who had a strangulated femoral enterocele, and the sac was drawn down, transfixed, ligatured, and removed. A few days afterwards urine escaped from the wound, and although the case ended well, the accident caused some anxiety. It is not hard to understand how such an accident might happen in an old person with a large and flaccid bladder, especially if we recall such cases of cystocele as that which Cloquet * mentions, and attributes, on good grounds, to dragging, which, however, was gradual and not sudden and violent.

The ligaturing of the neck and mouth of the sac requires great care. A mere ligature is dangerous. The neck of the sac, after having been freed and drawn down, should be transfixed and tied, then thrust backwards behind the plane of the fascia transversalis, and within the abdomen. Transfixion is, I venture to think, essential, but it is equally important not to leave the stump within the canal. Without transfixion the ligature has, on more than one occasion, slipped, and the mouth of the sac become a yawning chasm, almost impossible to secure and close, and then the intestines have escaped. Mr. Swinford Edwards † has, with honesty and candour, narrated such a misfortune, and he mentions another in the practice of Mr. Banks, and I am aware of a third accident of the same kind at the hands of another surgeon. Such a sad event could not have occurred if transfixion had been used. The ordinary Staffordshire knot answers the purpose very well, and is quite efficient. Dr. Mac-

* Cloquet, "Recherches sur les Causes des Hernies," pp. 21, 26.

† "Annals of Surgery," vol. i., p. 120

ewen's method of transfixing and folding the sac, it may have been inferred, is best adapted for the sacs which have not got adhesions with the spermatic vessels or vas deferens.

The sacs of congenital inguinal herniæ are treated upon similar principles, but their relations to the testicle, spermatic vessels, and vas deferens need consideration. As soon as the sac has been opened and its contents dealt with, the position of the testicle, spermatic vessels, and vas deferens should be exactly ascertained. The vas deferens, for reasons which I propose to give at the end of these lectures, when dealing with the structure of hernial sacs, lies close to and towards the inner side of the vessels, or in exceptional cases in front of the sac. The vessels usually lie in the fold which in my previous lectures * I described under the name of the plica vascularis. This fold begins at the head of the epididymis, and runs upwards along the back of the sac towards the cavity of the abdomen, where it may end on either the cæcum, vermiform appendix, ilium, and mesentery, or upon the sigmoid flexure. The serous membrane which forms the plica is, as I have ascertained from numerous dissections, and more than once from operations, so intimately related to its contents that they are incapable of separation from one another without the risk of injury to the vessels, and of thus depriving the testicle of its blood supply. On these grounds I cannot help thinking that operations which entail a serious interference with the relations of the spermatic vessels are likely to be followed by atrophy or sloughing of the testicle, and ought, if such be the case, to be deprecated for congenital sacs. These remarks also apply to operations upon the funicular variety of congenital hernia, and it may be added that the presence in them of a plica vascularis is an aid to their diagnosis. Keeping these circumstances in mind, two objects are aimed at in the treatment of the sacs of congenital hernia—first, to preserve a tunica vaginalis; and second, to obliterate the mouth of the sac. The first of these desiderata is accomplished by dividing the sac trans-

* "Hunterian Lectures on the Development and Transition of the Testis," by C. B. Lockwood, 1888, p. 109 *et s.*

versely about an inch above the epididymis, but leaving the plica vascularis untouched, and avoiding the vas deferens. The mouth of the testicular part of the sac may be sewn up with interrupted or continuous suture, and in sewing it up the mouth of the sac the posterior stitch should bring its cut edges round the plica, if there be one, and before closing the newly formed tunica vaginalis it is irrigated with an abundance of perchloride lotion. The closure of the tunica vaginalis is not free from risk, as in one of Dr. Ball's twenty-two cases it was followed by acute hydrocele and suppuration, and there was some trouble in two of Mr. Barker's cases.* However, it is not said whether irrigation was used in the treatment of this or of the other cases. An alternative to closing the tunica vaginalis is simply to leave it alone.

It is usually more difficult to isolate the mouth of the sac in congenital hernia prior to closure, because of the adherence of the spermatic vessels and vas deferens. When these are inseparable the sac may be divided longitudinally on either side of them, transfixed, folded, and secured as a pad,† and any redundant portion may be removed, and its mouth closed by such a plan as the following: A stout silk ligature about eighteen inches long is threaded upon a suitable curved needle (of course by two separate transfixions, the needle being rethreaded), and passed through the wall of the sac on either side of the vessels and vas, beginning on the inside; the remainder of the sac is then again transfixed near its middle and from the outside with each end of the ligature, and the latter is tied at the side opposite to the plica; thus the neck of the sac is secured with a figure of 8 loop, which omits the vessels and vas deferens. The stump should not be left in the inguinal canal, but pushed behind the plane of the fascia transversalis. The last procedure is the same if the sac has been made into a pad. The reduced sac should, if it has any tendency to extrude, be fixed in position by a deep suture. In Dr. Macewen's operation the suture is passed

* *Loc. cit.*, p. 337.

† Dr. Macewen, *loc. cit.*, p. 1269, also p. 11.

through the fascia transversalis, beginning at its abdominal aspect, and through the muscular and aponeurotic strata of the abdominal wall, and fastened; Mr. Barker * recommends an almost similar plan; and Mr. Kendal Franks † in difficult cases passes a silver suture through both pillars of the ring and through the neck of the sac, and brings them all together, and thus closes the ring and mouth of the sac at the same time.

The restoration of the abdominal rings and of the inguinal canal in congenital inguinal hernia depends a good deal upon their condition at the time of operation. Sometimes the canal and rings are merely dilated; but in neglected cases, besides being dilated, the canal is shortened, and its hinder wall displaced inwards. The cause of this is quite simple, and as is well known, is due to the hernial protrusion dragging the internal abdominal ring inwards, until it is opposite to the external abdominal ring. When this extreme degree of morbid change had been reached the inguinal canal ceases to exist, and the finger can be thrust through the hernial aperture straight into the abdomen.

The requirements of this part of a remedial operation are, therefore, clear, and numerous measures have been adopted to meet them. In Dr. Macewen's operation, which is thorough and systematic, a loop of ligature ‡ is passed through the tissues which form the hinder wall of the inguinal canal (fig. 28, Conjoint Tendon, Macewen), and is made to pull them outwards into their proper place by being passed through the aponeurosis of the external oblique, and fixed there. The ligature is entered from without inwards through the lower border of the conjoint tendon, and from within outwards, as high as possible, on the inner aspect of the canal. Thus a loop of ligature is left upon the abdominal aspect of the conjoint tendon (*vide* fig. 28). The lower end of the ligature is then passed through Poupart's ligament at its own level, and the upper end is passed through

* "Manual of Surgical Operations," 1887, p. 333 *et s.*

† *British Medical Journal*, Dec. 3rd, 1887, p. 1202.

‡ Chromicised catgut which has been prepared to last from fourteen to twenty-one days.

the transversalis and internal oblique muscles, and the aponeurosis of the external oblique at its own level, and their ends are tied outside the aponeurosis of the external oblique. If necessary another stitch of the same kind is introduced lower down, and the external abdominal ring is next closed as much as is required. The same result may be obtained by other methods; for instance,

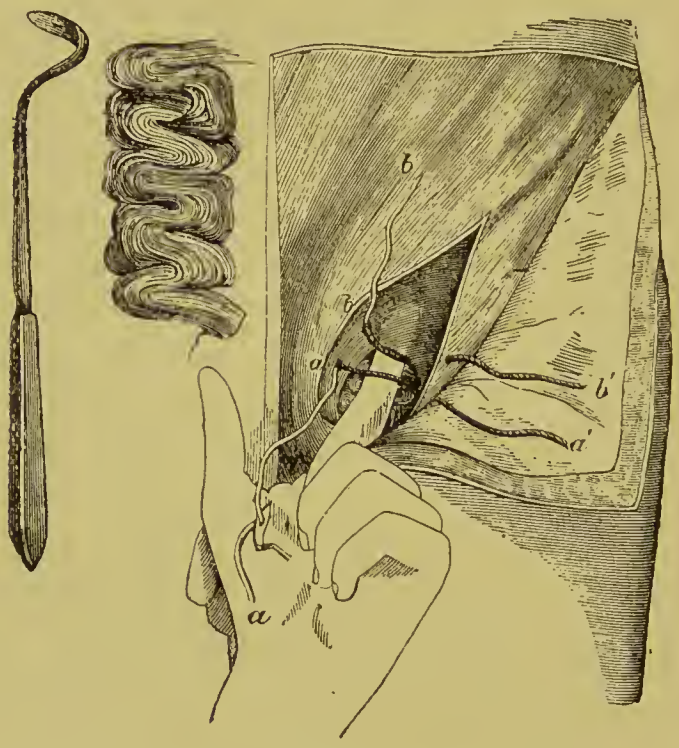


Fig. 28.
Jacobson, after Macewen.

On the left is one of Dr. Macewen's needles. They are made of one piece of steel. In the middle is the folded sac. The right-hand figure (modified from those of Dr. Macewen) is intended to show his method of suturing the internal ring. The index-finger in front of the folded sac is separating the peritoneum round the internal ring. The suture (*a b*) has penetrated the conjoined tendon at two places—first from without inwards, near its lower border, and secondly from within outwards, as high up as possible, a loop being thus left on the abdominal aspect of the conjoined tendon. At *a'* and *b'* the two ends of the above stuture have been passed, separately threaded on needles, from within outwards, through Poupart's ligament below, and through the transversalis and obliques above (Jacobson, p. 653, fig. 100).

Mr. John Wood * speaks of a method in which the ligature is crossed like a boot-lace, and Dr. Chushing † has described a similar kind of "quilted suture," which would answer the purpose.

In favourable cases the inguinal canal can be properly restored by such suturing as that which has been mentioned, but the anatomical conditions are not always so clear and definite as descriptions might lead one to expect. For instance, the internal abdominal ring is not the distinct thing which is described and figured. It has seldom a thick and defined margin, and the fascia transversalis is often thin in its vicinity, and passes, as Sir Astley Cooper ‡ describes, gradually over the cord or sac, to become the infundibuliform fascia. In the next place, the conjoined tendon of the internal oblique and transversalis, when properly dissected in a normal subject, does not afford the sharply defined free margin which it is the custom to describe, but is gradually continuous with the fascia transversalis at the place where the latter helps to form the hinder wall of the inguinal canal. Thus, whilst all agree that the conjoined tendon is attached to the crest of the pubes and inner part of the pectineal line, others rightly assert that it has, through the fascia transversalis, connections with the inner half of Poupart's ligament, and even beyond. The connection of the conjoined tendon with the fascia transversalis, and the junction of the latter with the crural arch, are described by Sir Astley Cooper.§ Dr. Mackay ‖ has also recently drawn attention to the band of aponeurosis derived from the internal oblique and transversalis, which "is directed downwards and outwards along the outer margin of the conjoined tendon, with which it is continuous, and passing close to the inner and lower border of the deep abdominal ring, reaches the crural arch, into which it is inserted, extending outwards as far as the middle of Pou-

* *Loc. cit.*, p. 1265 *et s.*, article on "Radical Cure of Hernia," in Heath's "Dictionary of Practical Surgery," vol. i., p. 698.

† *Boston Medical and Surgical Journal*, Dec. 6th, 1888.

‡ "Anatomy and Surgical Treatment of Hernia," p. 27.

§ "Anatomy and Surgical Treatment of Hernia," 1884, p. 25 *et s.*

‖ "Memoirs and Memoranda in Anatomy," by Cleland, Mackay, and Young, vol. i., London, 1888, p. 144.

part's ligament." Dr. Mackay goes on to say that Braune mentions the presence of this band, and names it "Hesselbach's band." Mr. Rutherford has also written upon the same point, and has arrived at similar conclusions.* The differences which appear in the various accounts are easily explained if we acknowledge that the width of the conjoined tendon is not constant, that its margin is indistinct, and that it may possess an additional outer band, namely, Hesselbach's band. Therefore, in restoring the hinder wall of the inguinal canal the importance of the fascia transversalis, strengthened as it is by bands of aponeurosis, should not be lost sight of, and it should be used in the process of repair. Independent sutures may with advantage be placed so as to close the internal ring, and at the same time draw outwards the fascia and aponeurosis, which form its inner margin; the aponeurosis of the external oblique affording a holding ground for the sutures.

As a bar to the hernial protrusion the external abdominal ring is less important, but if it is dilated its size should be reduced with sutures until it is just wide enough to transmit the spermatic cord and its various constituents.

Before closing the canal, and at intervals during the operation, it should be irrigated with a copious stream of warm perchloride of mercury lotion—1 in 1,500 or 1 in 2,000 strength—and this should be repeated before the skin incision is closed.

The question of drainage turns upon the nature of the operation. If the latter has been performed cleanly and expeditiously, upon good tissues, drainage may be dispensed with. When the wound is sterile it behaves like a simple fracture, and causes as little anxiety. After dusting the fold of the groin and the wound with iodoform, a large dressing should be put on,† and thorough uniform pressure applied with a Martin's rubber bandage, care being taken to apply wool over the anterior superior spines of the ilia, and over any other bony projections.

* "On a Case of Oblique and Direct Hernia on the Same Side," by Hy. Rutherford, *Lancet*, Feb. 23, 1889.

† At present I myself am using alembroth gauze and wool, with a carbolic gauze dressing over all, and find it reliable.

Owing to the intra-abdominal condition and the wide-spread bulging of the hypogastric fossæ, and the size of the neck of the sac, acquired inguinal herniæ are not, as a rule, suitable for curative operations performed upon the abdominal walls; but there are many occasions upon which such tumours have to be dealt with, such, for instance, as after strangulation, for repeated obstruction, irreducibility, and painfulness.* But as may have been gathered from what has already been said, the conditions of a curative operation are harder to fulfil in acquired hernia, especially in the direct variety, and although the attempt ought under some conditions to be made, it should merely be as a preliminary to the wearing of a truss.

The question is often raised as to whether the patient ought to wear a truss after a radical cure. The answer depends upon the condition of the suspensory apparatus of the intestines, and, in an equal degree, upon the completeness with which it has been possible to perform the curative operation. It is unnecessary to discuss further the means by which the state of the first may be diagnosed, and the latter is sufficiently clear at the time of the operation and afterwards.

Treatment of the Contents of the Sac.

The contents of hernial sacs which oftenest require to be dealt with are intestine, omentum, and the testicle when it is undescended.

The bowel gives no trouble unless it is adherent, in which case its reduction may be impracticable. Before operating, an attempt should always be made to ascertain the presence or absence of adhesions. The connections of the gut with the sac are of three sorts: first, inflammatory, or acquired; second, the natural mesenteric attachments; and third, congenital bands, more particularly the plica vascularis. The inflammatory adhesions, of course, vary in extent, and can usually be overcome; it is unnecessary to dwell upon them. The adhesions which are in

* The treatment of some of those cases which cannot be retained with trussesare mentioned later.

reality mesenteric attachments are much more formidable, and have often prevented the completion of the operation, and led to the death of the patient. They are met with in those cæcoceles which have an incomplete sac. Mr. Mitchell Banks * says that "of all the forms of hernia with which I am acquainted, those in which what may be called a landslip of the cæcum takes place present the greatest obstacles to the return of the bowel, and involve the greatest risk to the patient." The accompanying figure

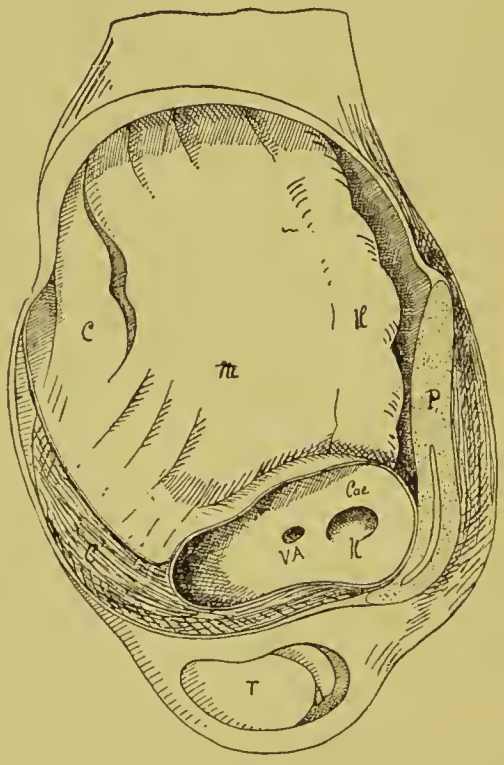


Fig. 29.

Hernia of the Cæcum.—C., Colon. M., Mesentery of Colon. Il., Ileum. V.A., Vermiform Appendix. Cæ., Cæcum. P., Plate with Cavity.

(fig. 29) is a typical example of this condition. The specimen was obtained from an aged man who was brought for dissection. He had on the right side an enormous hernia, which contained a large part of the ilium and great omentum. The lower half of the right colon

* *Loc. cit.*, p. 1259.

ran down the back of the sac, towards its outer side (fig. 29), and was only partially covered with peritoneum on its front surface; at the bottom of the sac it entered the cæcum, which was likewise partially covered with peritoneum; into the end of the colon opened the ilium, which ran down the inner and hinder wall of the sac, to which it was attached by its mesentery, which was short below but about two and a half inches long where it entered the mouth of the sac; the vermiform appendix was hidden beneath the cæcum. The testicle lay in a separate tunica vaginalis, and the epigastric artery was internal to the capacious mouth of the sac. The wall of the sac was enormously thick, and had between its layers a large, hard, dense, fibrous plate of oval shape, about three inches in its longest diameter, and half an inch thick near the centre, but thin at the edges. This plate lay towards the inner and front part of the sac (fig. 29), and in its midst there was a distinct cavity, with smooth and shining walls, and occupying about a third of the area of the plate. Such masses as this have often been described,* but the presence of a cavity in their midst has not hitherto been noticed, and there was no clue to the nature of that which has just been mentioned—whether of bursal origin or congenital.

This case was met with before I had begun to make systematic measurements, but a sketch was made of the interior of the abdomen, in which the root of the mesentery was as low as the base line, and the hepatic flexure of the colon lay in the right iliac fossa. The length of the mesentery was not measured.

The foregoing is of course an extreme case, but the literature of hernia abounds with examples of every degree.† Old-standing and enormous right herniæ often contain the cæcum, and prudence dictates that they should be avoided. Of course other portions of the intestines may have strong mesenteric adhesions with the sac, particularly the sigmoid flexure and the end of the ilium. Rather than attempt the division of such adhesions they, together with a part of the sac, should be reduced within the abdomen.

* See Lawrence on Rupture, p. 37.

† Scarpa, *loc. cit.*, plate vii., figs. 1 and 2, also plate viii., fig. 1.

As surgeons are agreed that the omentum ought to be removed when it forms part of the contents of the sac, nothing further need be said upon the point; but it cannot be repeated too often that extreme care should be taken to secure the omental vessels before that structure is returned into the abdomen. This is best done by a series of ligatures which *transfix* the omentum and interlock with one another. In Mr. Edward's case, already mentioned, the ligature slipped from off the omentum as well as from off the neck of the sac, and laparotomy had to be performed. In another case I assisted a colleague to open the abdomen for a like accident. The operation was grave and difficult, because it was necessary to follow the omentum upwards towards the epigastrium, whither it had retreated after its return into the abdomen. It seems usual for the omentum to retreat in this manner, and I have so often seen it do so in other cases, which have died after kelotomy, that on another occasion, if called upon to deal with such an accident, I should, after having explored the wound, proceed with a small incision in the upper part of the left linea semilunaris.

When congenital hernia is complicated with retained testicle it is by far the best to remove the gland, which is often atrophied and, according to some, unlikely to be of any functional value.

The principles of the treatment of femoral hernia are substantially the same a those of inguinal hernia, and I do not propose to enter into the minute details of the treatment of the sac or closure of the femoral aperture. After having been isolated, transfixed, and ligatured, the neck of the sac should be returned within the femoral ring, and if the latter is patent it should be narrowed with a ligature passed through the pubic portion of the fascia lata and through Hey's ligament, *i.e.*, that portion of the falciform process of Burns which runs inwards below Poupart's ligament to reach the spine of the pubes.

The after treatment of these operations for the cure of hernia is the same as for other abdominal operations. The patient is placed in bed with his thighs flexed and supported upon pillows, and a hypodermic injection of morphia (usually a quarter of a grain) is given to relieve pain. Iced soda-water is given during the

first twelve hours, and iced milk and soda-water and a little cold beef essence during the following day. Afterwards the diet is gradually improved by adding beef tea, egg pudding, fish, or other light articles of diet. The patient is kept lying down in bed for at least three weeks, and if the wound is then soundly healed is permitted to lie on a couch for another fortnight. Exertion of any sort is debarred for at least three months after the operation. If no drainage-tube has been used the wound ought not to want dressing until it has healed; if a drainage-tube has been inserted the wound is dressed once for its removal; this may be done at the end of forty-eight hours after the operation, but there is little harm in leaving it longer. During this treatment opium and other drugs are used as sparingly as possible, and the bowels usually act naturally on the second day; if they do not, a little liquorice, however, is usually all that is required. If the operation is aseptic very little trouble or discomfort is experienced, except the irksomeness of lying in bed.

The Treatment of Prolapse of the Mesentery.

When inguinal or femoral hernia is associated with prolapse of the mesentery the removal of the sac and the closure of the aperture in the abdominal wall afford hardly any prospect of a permanent cure. Such a procedure does not deal with the cause of the disease, and the restoration of the mesentery to its proper height would seem to be the only real remedy. As prolapse of the mesentery is comparatively common, there is no difficulty in ascertaining after death that this can easily be accomplished; and further, that the mesentery can be retained without difficulty in its restored position, and that the excessive tendency of the intestines to protrude can apparently be remedied. To achieve this during life an operation of some severity is required, and therefore most cases of acquired hernia are much more fitted for the palliative treatment of a truss. There is great room for skill and ingenuity in the selection and adjustment of trusses for the retention of difficult and unmanageable herniæ. The German truss is usually the best for both inguinal and femoral ruptures, and may

be modified to meet the emergencies of each particular case. But cases are sometimes met with in which no kind of palliative treatment can be carried out. These are sometimes dealt with by operations upon the sac and abdominal walls, but it is clear that this should merely be undertaken with the view of enabling a truss to be worn.

There is also another plan of treatment, by which cases of hernia which are complicated by prolapse can be made amenable to treatment. It is perfectly well known that many ruptures which are irreducible, or which cannot be supported by a truss, are benefited and rendered capable of treatment by prolonged rest in the recumbent position. After all that has been said about prolapse of the mesentery, I need not pause to discuss why this should be, but I venture to suggest that such treatment should always be tried before it is assumed that any case of acquired hernia, where obvious adhesions cannot be diagnosed, is irreducible or incapable of being retained with a suitable truss. Further, it is obvious that a good effect is more likely to result from this method of treatment if the foot of the bed be gradually raised upon suitable blocks. Patients become accustomed to this treatment, and learn to bear a tilting of six or even nine inches without complaining. Cases of acquired hernia are sometimes met with in which these measures fail, and in which the complaint prevents the patient from earning his livelihood, and renders his life a misery. In a case of this kind my friend Mr. Bruce Clarke, to whom I had demonstrated prolapse of the mesentery, operated with the view of restoring the position of the mesentery. The patient was a man fifty-seven years of age, who had suffered from hernia for many years. He had an enormous femoral hernia, which had been operated upon four years before by Mr. Bruce Clarke for the relief of strangulation; there was also a femoral hernia of moderate size on the left side. Every effort was made to give relief, but the intestines could not even be retained as the patient lay in bed, and after prolonged rest, with the end of the bed raised. The shape of his abdomen was typical of prolapse of the mesentery, and was the same as that which has already been

figured as being diagnostic of that condition (fig. 27). From the characters of the herniæ, the age of the patient, and the shape of the abdomen, I inferred that the usual alterations had taken place in the position of the viscera, and that the root of the mesentery had descended the spine, and had been accompanied by a descent of the transverse mesocolon and hepatic flexure of the colon, and perhaps of other organs. As I have already explained, the tendency of the prolapse is towards the left groin, and therefore it was agreed that the mesentery and transverse mesocolon ought to be raised towards the right costal cartilages and fixed there with suitable sutures. I may say that both Mr. Bruce Clarke and myself had fully ascertained that this could be done without any apparent interference with the functions of the intestines, and with every prospect of a good result. The risks of the operation having been explained to the patient, an anæsthetic was given, and the following operation was performed by Mr. Bruce Clarke. The abdomen was opened by an incision in the right linea semilunaris, beginning an inch from the costal cartilage, and extending downwards for about four inches. The root of the mesentery and the transverse mesocolon were found with ease, and were attached at the level of the umbilicus. When the root of the mesentery was drawn upwards the intestines left the interior of the sac. Two strong silk loops were passed through the upper part of the mesentery, and then through the transverse mesocolon, and fastened separately to the abdominal wall, close to the costal cartilages and at the upper part of the wound. The stitches effectually prevented the return of the hernia, and the wound was closed in the usual way. I need hardly say that more reliance was placed upon the formation of peritoneal adhesions than upon the sutures, as a means of maintaining the mesentery in its new position. It is sad to say that this operation ended in the patient's death, but the fatal result was not attributable to any failure in the principles of the operation which had been performed. The notes of the examination say that "there was some localised peritonitis around the wound, and that the ligatures were holding the mesentery firmly up. A coil of small intestines lay just within the mouth of the

hernial sac, and was surrounded with peritonitis, due to a small perforation in the wall of the gut; the perforation was of traumatic origin." Thus, owing to an unfortunate accident, the operation was of no avail.

Umbilical Hernia.

Two cases bearing upon the pathology of umbilical hernia have been met with during this inquiry: the first shows how an increase in the intra-abdominal pressure can produce an umbilical sac, and also, as it happens, another of a different kind; the second illustrates the usual morbid anatomy in large umbilical herniæ, and the difficulties which may be encountered during operations upon them.

The first case was that of a male aged thirty-eight years, and 6 feet 2 inches high, who died with cirrhosis of the liver and distension of the abdomen, due to ascitic fluid. There was a thin-walled and rather deep pouch at the umbilicus, and a femoral pouch on the left side, which easily admitted the first joint of the index-finger. The mesentery had a macerated appearance, and was 8 inches long, and, together with the transverse mesocolon, was attached 4 inches above the base line. The cæcum fell short of the right crural arch, and the ilium passed 1 inch beyond that landmark, and could not be dragged as far as either the pubic spines or the left crural arch. The colons were normal.

It is well known that ascites often causes an umbilical protrusion, and this case exemplifies this, and also shows how other sacs can be produced in a like manner.

The excursion of the intestines was so restricted that it seems impossible for the femoral pouch to have been caused by the pressure of the intestines. In another case of a like kind it might be possible to ascertain the pressure of the ascitic fluid under different conditions of respiration and exertion, and so get an idea of the amount of pressure which is needed for the creation of a hernial sac.

The second case of umbilical hernia was that of a stout and aged female, who had an umbilical hernia which consisted of two

sacs, a larger and a smaller. The swelling which they together made was 3 inches in diameter. Their walls were as thin as the walls of umbilical sacs usually are, and the larger sac was filled with great omentum and a loop of transverse mesocolon; the smaller sac contained nothing but omentum. These contents were so closely adherent to the thin-walled sac that it was impossible to separate them from one another. The herniated gut and omentum had escaped by the umbilical ring, which was greatly enlarged. The division of the sac into two was caused by a band of fibrous tissue which descended from above to reach the umbilical scar (*vide* fig. 30), which lay hidden away beneath the lower

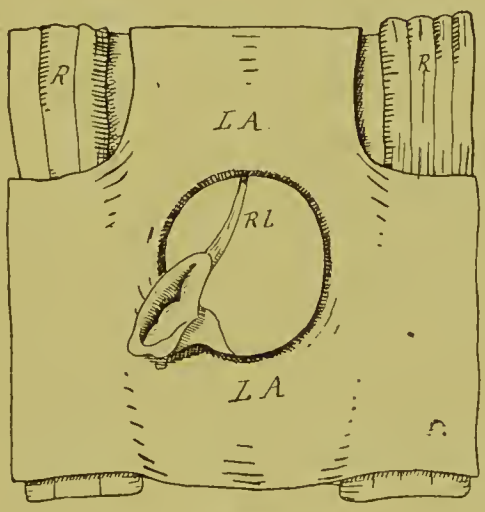


Fig. 30.

L.A., Linea Alba. R., Rectus Abdominis. R.L., Round Ligment of Liver (obliterated Umbilical Vein).

bulging of the sac. This band was the obliterated umbilical vein; the obliterated urachus and hypogastric arteries also ended in the umbilical scar, towards the lower margin of the ring, and therefore below the sac. The linea alba was very much wider than usual; the recti, which were infiltrated with fat, were $1\frac{1}{2}$ inch apart above the umbilicus and $2\frac{1}{2}$ inches apart just below it. The linea alba became gradually narrower as it ran upwards towards the ensiform cartilage, but quickly narrowed as it ap-

proached the pubes, and ended midway between that bone and the umbilicus.

The proper abdominal measurements were not taken in this case, but nevertheless it illustrates the difficulties which may be met with in operations on umbilical herniæ, and also that the defect in the abdominal walls extends far beyond the region of the umbilicus.

According to Sappey,* the linea alba is about two-thirds of an inch wide at its widest part, which is at the umbilicus, and is wider in females than in males. Mr. Birkett† has remarked that the linea alba becomes stretched in adult life by pressure from within, and I have frequently found the linea alba of stout subjects to measure an inch or more in width. Although obesity is a common cause of this stretching, there are many others, and in women, in whom it is said to be common, repeated pregnancies are not one of the least important. It is obvious that such a wide-spread imperfection of the abdominal wall as that which has just been described ought to be taken into consideration before curative operations are attempted upon large and long-standing umbilical herniæ. The museum of St. Bartholomew's Hospital is rich in herniæ of this kind, and in all the large ones the widening of the linea alba is very great, almost as much as in the present instance;‡ indeed, this morbid alteration is, I believe, a common accompaniment of umbilical hernia. It is an obvious detriment to a curative operation, and there are other reasons which should make one pause before entering upon such an undertaking. The thinness of the sac wall and the adhesion of its contents, both common features of umbilical herniæ, often prolong the operation and enhance its difficulties. Further, the peritoneum above and around the umbilicus is so thin and adherent, especially above, that it neither favours the operation nor affords a strong barrier against further protrusions. But after an operation for strangulated umbilical hernia the state of

* "Traité d'Anatomie," vol. ii., p. 237.

† *Loc. cit.*, p. 728.

‡ See spec. 2,154, 2,157, 2,158, and 2,159.

the rupture and the condition of the patient may be sufficiently favourable to permit of a curative operation being performed. Under these circumstances the sac and a portion of the linea alba above and below the sac should be taken away, and the wound closed as in laparotomy. The best material which is at present available for this purpose is silkworm-gut (fishing-gut), which should be soaked in 1 in 20 carbolic lotion for at least two or three hours before being used and carefully tested. I am accustomed to insert these sutures not less than half an inch apart, beginning well above and well below the wound, and including plenty of peritoneum, abdominal wall, and skin. All the precautions for obtaining asepsis which have been already mentioned in this lecture should, of course, be taken in carrying out this operation, and a properly fitting abdominal belt is required afterwards.

The above is not intended to imply that operations upon umbilical herniæ are to be commended. Those which occur in infancy are easily cured by a well-applied apparatus, the requirements of which are, first, that it shall keep the rupture reduced without having any cork, or pad, or projection to press into the umbilical ring and keep it open; and second, that it shall bring the margins of the umbilical ring together. Both of these conditions can be best fulfilled by strips of strapping properly applied. Operations upon large umbilical herniæ have hitherto been attended with such fatality that, except under urgent circumstances, they are best left alone.

Before leaving this case perhaps a word may be said concerning the sac and its contents.

The walls of the sac were, as I have already said, exceedingly thin, and consisted as usual of peritoneum, subcutaneous connective tissue, and skin; but no covering of umbilical fascia (a prolongation of the fascia transversalis) could be found. The protrusion of the rupture upon either side of the obliterated umbilical vein, and the consequent manufacture of a double sac, throw light upon a point which has often been remarked upon. Our text-books on Surgery* always refer to the irregularity of umbili-

* *E.g.*, Erichsen, "Science and Art of Surgery," vol. ii.

cal sacs. Sir Astley Cooper * depicts a specimen very like that which is being considered, and South † describes one which must have been its fellow; ‡ he says, "The rupture, about the size of a half-quartern loaf, had somewhat the shape of the figure 8, the head of which was rather smaller, and bent over to the left side. In the course of the operation a deep, tough band of cellular tissue was found thrusting down the middle of the hernial sac, which retained the indentation, after the cellular band had been cut through. The sac contained a large quantity of hard, impacted omentum, and some inches of intestine." South does not identify this band, but it seems reasonable to suppose that it was the remains of the umbilical vein. When we consider the anatomy of the umbilical ring and its contents the likelihood of this is increased.

Four strong bands of fibrous tissue pass through the umbilical ring, to end in the umbilical scar, namely, the obliterated umbilical vein, the two obliterated umbilical arteries, and the urachus; of these one, the vein, descends from above, and the other three ascend from below. Now, it seems probable, in the case of any protrusion through the umbilical ring, that the three inferior bands, being strongest, would hold the umbilical scar against the lower margin of the ring, whilst the superior band would either be thrust aside or permit the rupture to escape by its sides. It is quite clear that the last alternative prevailed in the case I have described, and probably in South's. The manner in which the obliterated arteries and urachus bend over the lower margin of the umbilical ring, to be inserted into the cicatrix, suggests that they can hardly ever be displaced and carried before an acquired umbilical hernia; although Scarpa § has argued the contrary.

As regards the contents of the sacs, it is only to be said that the omentum, besides being everywhere adherent, made a sac

* *Loc. cit.*, plate xxi., figs. 1 and 2.

† South, "Chelius' Surgery," vol. ii., p. 80.

‡ Sp. 2,156, St. Bartholomew's Hosp. Museum, is also very like the one described, but is smaller.

§ *Loc. cit.*, p. 387.

for the herniated loop of transverse colon, and therefore would have required division for the discovery of the gut. Also, although each of the divisions of the umbilical ring was large, yet the omentum and gut were both tightly constricted and could not be withdrawn.

Ventral Hernia.

This is a convenient place to mention another rare, perhaps unique, hernia which was met with in the course of these investigations. Whilst dissecting the abdominal walls of a middle-aged

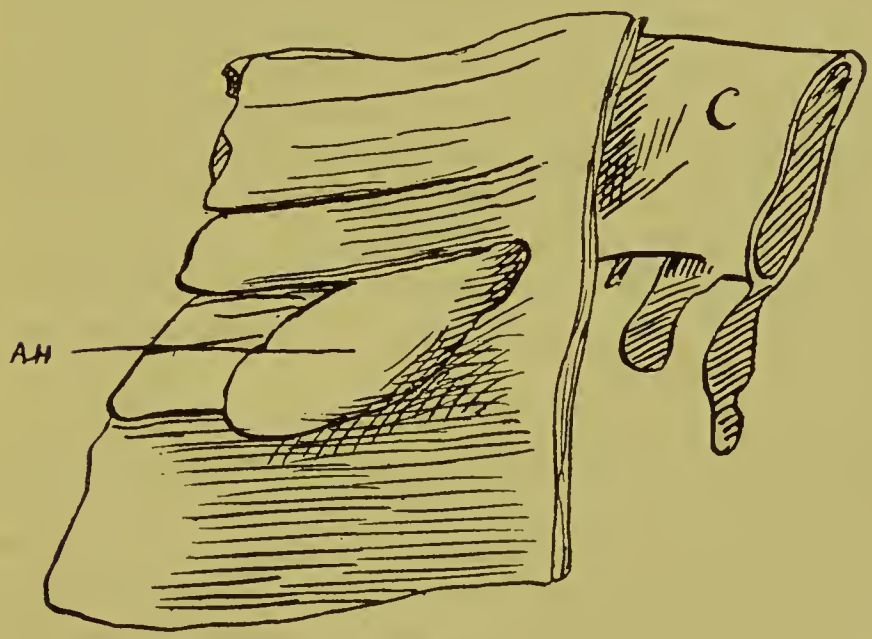


Fig. 31.
C., Colon. A., Appendix.

subject a small sessile lobe of fat was found protruding through a round hole in the linea semilunaris, at the level of the anterior superior spine of the ilium (fig. 31). It was thought at first that it was only one of those subperitoneal lipoma which are commonly found escaping where vessels pierce the abdominal wall. But when the abdomen was opened the hernia was seen to be one of the appendices epiploicæ of the colon, which had

escaped through the mouth of a small peritoneal sac, which was so thin and delicate that its existence could hardly have been noticed upon the outside of the tumour.

The formation of this hernia seems quite inexplicable. There was no scar or evidence of wound, abscess, or disease of the abdominal wall, and it seems equally hard to attribute it to a development defect, inasmuch as the appendices epiploicæ are not developed until long after the abdominal walls are completed.

Cæcocele.*

Two cases of cæcocele have been described in these lectures; in one of these (fig. 29) the cæcum, a large part of the right colon, the vermiform appendix, and some feet of the ilium had descended into the sac, accompanied by their usual peritoneal attachments; in the other (fig. 21) the vermiform appendix ran down the back of the sac, and the caput cæci lay free within its mouth and upper part, the rest being filled with small intestines. Besides these, I have dissected three other cæcoceles, one of which has been described elsewhere.† As a great deal of doubt and confusion envelopes this kind of ruptures, perhaps a short reference to them may be allowed.

To begin with, the term cæcocele is somewhat inexact, because a hernia of the cæcum, uncomplicated by the protrusion of any other viscus, is seldom or never seen. So far as can be gathered from works on anatomy, the cæcum is "that part of the large intestine which is situated below the entrance of the ilium,"‡ and would, therefore, be marked off from the large intestine by a line drawn across the right colon at right angles to its axis, and on the same level as the lower margin of the ilium. This definition accords with the developmental history of the cæcum, because it originates as a diverticulum from the side of the rudimentary alimentary canal, and under normal circumstances this

* The hybrid word "cæcocele" is sanctioned by custom, but "typhlocele" would be more classical.

† Royal Med. Chir. Soc. Trans., vol. lxix., p. 506.

‡ Quain's Anatomy, 9th edition, vol. ii., p. 615.

outgrowth is entirely covered with a layer of serous membrane, which it retains throughout the life of the individual.* Keeping the above definition of the cæcum in mind, it is clear that a pure cæcocele hardly ever exists. In addition to the cæcum, those ruptures contain the vermiform appendix, a portion of the ilium, and a portion of the ascending colon; and to this multiplicity of contents they owe a peculiarity of diagnostic value, namely, their large size. In four of the five cases dissected by myself the cæcum retained in its entirety its serous covering, but in the fifth (fig. 29) it was partially denuded. In each case there was a hernial sac of the ordinary kind, and it is impossible to find a cæcocele without a sac in any of the museums of London or Paris.† As regards the arrangement of their serous membrane, the sacs of these cæcoceles are "complete" or "incomplete." In a cæcocele with a complete sac the cæcum and any other contents are free within the lumen of the sac, and the walls of the latter are not reflected round any part of the intestine. The following specimen, for which I am indebted to Mr. Maude, is an instance of this (fig. 32). It was obtained from a man aged seventy-two, who died of bronchitis after Mr. Maude had performed an operation for the relief of strangulation. The sac was very capacious, and contained the cæcum, vermiform appendix, a portion of ilium, and a quantity of purulent fluid; the testicle lay in a separate tunica vaginalis, below and rather in front of the sac. The various parts of the intestines were free within the sac, and in the figure they have been withdrawn to show the completeness of its walls. A strong fibrous-looking band ran upwards from the head of the epididymis towards the ilium, cæcum, and vermiform

* Treves, "Hunterian Lectures on the Intestinal Canal," p. 38 *et s.* Tuffier, in an excellent paper ("Etude sur le Cæcum et ses Hernies," *Archives Générales de Médecine*, 7th series, vol. xix., p. 642), says 9 per cent. of the hundred bodies examined had the superior and posterior third of the cæcum uncovered by peritoneum.

† See also Treves, "Hernia of the Cæcum," Medical Society's Proceedings, vol. x., p. 11. Tuffier, *loc. cit.*, vol. xx., p. 59, describes a cæcocele which he says had no sac and was of the congenital variety. He considers the absence of the sac to be diagnostic of congenital cæcocele.

appendix, and onwards towards the peritoneum of the back of the abdomen. This band accompanied and surrounded the spermatic vessels, but the vas deferens lay apart, in front of, and rather to

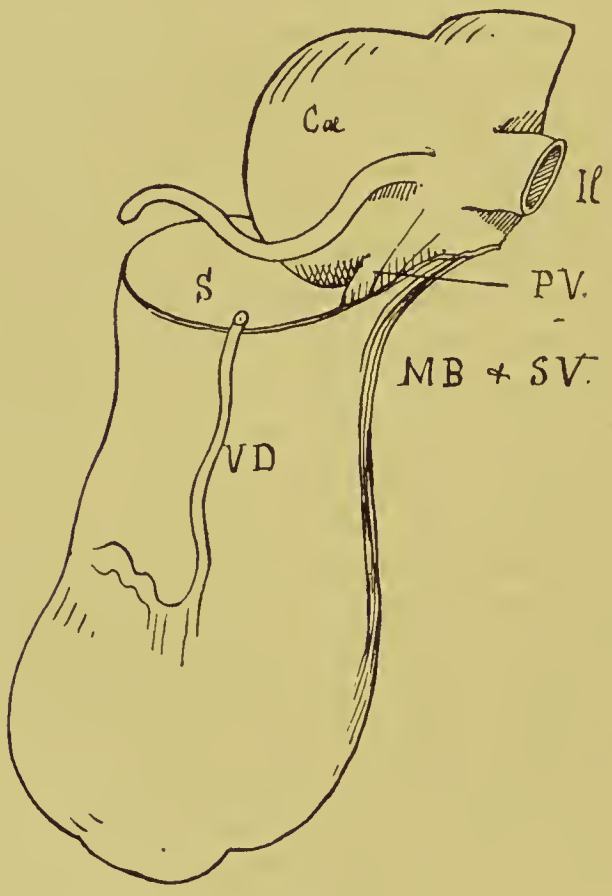


Fig. 32.

Cæcocele, with complete Sac.—Cæ., Cæcum. Il., Ilium. M.B. and S.V., Muscular Band and Spermatic Vessels. S., Mouth of Sac. V.D., Vas Deferens.

the inner side of the sac. Doubtless these fibres were the remains of the continuation of the gubernaculum testis which I have described elsewhere, and endeavoured to identify with the internal cremaster.* Although the history of this case was

* "Hunterian Lectures on the Development and Transition of the Testis."

very obscure (the man had had the rupture for more than forty years, and ever since he could remember), yet the close relations of the vas and vessels and of the internal cremaster to the sac suggest that it had a developmental origin, and that it was of the congenital funicular variety, and therefore the same as the cæcocele described in the Royal Medico-Chirurgical Transactions.* Another cæcocele was so like this that it hardly calls for a separate description. The cæcum and vermiform appendix, together with a large piece of ilium and some of the right colon, hung free in the lumen of the sac; and this was rendered possible because the lower part of the right colon had retained its fœtal condition and had no mesocolon. The sac wall of this hernia was exceedingly thick, and had between its layers a firm and resistant fibrous plate, the same as that found in the other case, but without a cavity in its centre.

In those cases of cæcocele in which the sac is "incomplete" the serous membrane which forms the sac is reflected on the cæcum in such a manner as to leave a portion of its muscular wall uncovered. If we confined ourselves to the definition already given of a true cæcocele this class of hernia would be exceedingly rare. As a matter of fact, authors have used the expression cæcocele very loosely, and have often included a large part of the ascending colon under the term. In the enormous cæcocele described in the earlier part of this lecture quite a third of the muscular wall of the ascending colon is devoid of a serous covering (fig. 29), and it is evident that the portion uncovered exceeds what is customary when the gut occupies its proper situation; but in spite of this, the cæcum has a good covering of serous membrane, and only a small portion, about a third, of its hinder wall is bare.†

It seems probable that there are at least three ways in which the cæcum and a part of the large intestines find their way into hernial sacs. In congenital cœcocele it occurs in the following way: During fœtal life a peritoneal fold, which contains the

* *Loc. cit.*, vol. lxix., p. 506.

† See an admirable account of a congenital cæcal hernia, by Professors Bennett and Cunningham, London, 1888.

spermatic vessels and the upward prolongation of the gubernaculum testis, runs upwards from the globus major of the epididymis to the cæcum, vermiform appendix, and to the ilium and mesentery. Owing to the presence of these attachments, those portions of the intestines may be pulled down by the testicle in its transition, and it is not unlikely that this was the history of two of the cases which I have dissected, namely, in Mr. Maude's case and in that of the infant.* Sometimes the contrary happens, and the intestines prevent the transition of the testis.

In acquired cæcocele the specimens seem to indicate that the protrusion of the cæcum, vermiform appendix, and colon are secondary to an ordinary enterocele. It is generally allowed that as a hernial sac enlarges there is a displacement of the loose peritoneum which lines the iliac fossæ, and therefore, as an ordinary enterocele or entero-epiplocele enlarges and displaces the peritoneum, the cæcum, vermiform appendix, and a part of the ascending colon are drawn into the sac, and thus a second method of formation prevails. But there is a third mode of formation, which is the same as in other forms of acquired hernia, namely, by a giving way of the supporting apparatus of the cæcum and colon, and the subsequent protrusion of those parts of the intestines by the expulsive action of the abdominal muscles and diaphragm. Before leaving this question it may be remarked that cases of floating cæcum, such as that described in the first lecture, and in which the cæcum and the small and large intestines had a common mesentery (fig. 9, p. 31), afford conditions which seem especially calculated to permit displacements of the cæcum and ascending colon. Of course the case referred to is an exaggerated instance, but minor degrees are by no means uncommon.

The relation of the cæcum and colon to the hernial sac is, as Scarpa points out, of practical importance to surgeons. As the cæcum and colon descend into the sac, the direction of their

* Professors Bennett and Cunningham, *loc. cit.*, found these fibres in their case, and attribute to them an important share in the causation of the cæcocele.

course is from within the right anterior superior spine of the ilium, along the crural arch, through the outer part of the mouth of the sac, and so on down the outer and front part of the sac, towards its fundus. This was evidently the case in the large hernia depicted in figure 29, and it is clear that had an incision been made into the front of this sac and towards its outer side, the bowel would have been opened without the presence of a sac having been ascertained. In consequence of this, I am accustomed in operating upon large herniæ to carry the incision well towards the inner side. In looking through the records of operations upon strangulated herniæ, it appears that in ninety-five cases of inguinal and femoral hernia the cæcum was twice mistaken for the sac wall, and opened. In one case the note says that the cæcum was in front of an ordinary hernial sac, but not in the sac itself; the latter contained small intestine, which was reduced, but the patient died on the sixth day after the operation, from exhaustion. In the other case the cæcum was stitched to the edge of the wound, and although the patient recovered, a permanent fæcal fistula was the result.

Thus, of the five cæcoceles which I have dissected, two were probably congenital, and three acquired. Both the congenital cases had a complete sac, and one of the acquired. Of the two remaining cases, one had an incomplete sac (fig. 29), and in the other the sac was only incomplete in the sense that the vermiform appendix was attached to its hinder wall (fig. 21).

It is hardly necessary to point out that these cases of cæcocele are unfavourable for curative operations. I regret not to have obtained a proper record of the condition of the suspension of the mesentery in any of them, but it may be remembered that in one case there was evidence to show that the root of the mesentery was on a level with the base line, and it is probable that a low attachment prevails in the acquired cases. With regard to congenital cæcocele, it seems not improbable that the intra-abdominal condition was more favourable. Fortunately, the upper part of the body of the infant from whom one of the congenital cæcoceles was obtained was preserved; and although the exact height of the mesentery could not be taken, the pelvis having dis-

appeared, yet its root was certainly in its natural place. Further, the excursion of the intestines, although not greater than is usual in infants, was quite sufficient to account for the size of the sac. It remains to be ascertained how far the intra-abdominal conditions are favourable or unfavourable for operations for the cure of cæcocele, but it seems highly probable that there is a great difference between congenital and acquired cases, the former being quite favourable in this respect.

But the morbid state of the abdominal wall and the arrangement of the sac are such as to make curative operation upon cæcoceles more difficult to perform and less certain in result than in ordinary cases. In the first place, the mouth of the sac is exceedingly capacious, and the internal abdominal ring dilated, and the inguinal canal is often obliterated. Next, the connections of the intestine with the testicle and with the sac may present obstacles, but these adhesions are, perhaps, less frequent than is supposed.

Herniæ of the sigmoid flexure have a very strong similarity to cæcocele, and admit of being classified in exactly the same way; first, as regards their origin, into congenital and acquired; second, as regards the arrangement of the sac, into "complete" and "incomplete." This kind of hernia has hardly had the attention it deserves, and although it is not uncommon, our museums do not contain many specimens. It is well known that a serous fold, the plica vascularis, which contains the spermatic vessels, connects the testicle with the sigmoid flexure during fœtal life, and it is also recognised that this fold is sometimes the cause either of the retention of the testicle within the abdomen or of the passage of the intestine into the processus vaginalis, to form a congenital hernia of the sigmoid flexure. I have several times seen a fold of this nature running upwards from a hernial sac to the sigmoid flexure, but have not yet obtained an undoubted congenital hernia of this part of the large intestine. Just as in other forms of hernia, a good deal of difficulty in diagnosis is caused by the funicular variety. In hernia of the sigmoid flexure it is quite common to find serous folds running up the back of the sac,* and

* Sp. 2,111, Guy's Hospital Museum.

such a thing is well represented in one of Scarpa's drawings.* A case of acquired hernia of the sigmoid flexure has already been described in this lecture, in which the intestine was attached to the back of the sac by a short mesentery, and there was, in addition, a prolapse of the jejunum. In this instance the sac probably owed its origin to the pressure of the jejunum, and the hernia of the sigmoid flexure was secondary, being due to the displacement of the peritoneum which lines the iliac fossa during the formation of the sac. This was an example of an incomplete sac, and Cloquet† has mentioned another case, in which the sigmoid flexure was held by what he calls a natural fleshy adhesion, in such a manner that the part of the intestine which is between the layers of the mesocolon lay in contact with the spermatic vessels. How far beyond this the sigmoid flexure may be uncovered I am not aware, but there seems no reason why more extreme degrees should not occur.‡

Besides the acquired hernia of the sigmoid flexure which has just been mentioned, I have dissected another specimen, which has been placed in the museum of St. Bartholomew's Hospital.§ Here the sigmoid flexure hung free within the lumen of the sac (which was therefore complete), and was suspended by a long mesentery, whose base was attached within the abdomen in the iliac fossa. The sac was of large size, and the constituents of the cord were spread out (more than an inch apart) upon its posterior surface, the vas deferens being internal and the vessels external.

It would be very rash to pretend to give rules for the diagnosis of hernias of the cæcum and sigmoid flexure. The contents of hernial sacs are, as Petit‖ has admirably said, full of deception, and as a rule their nature can only be affirmed after an incision

* *Loc. cit.*, fig. 1, plate viii.; also page 211.

† "Recherches sur les Cause, etc., des Hernies," p. 59.

‡ Like cæcocele, hernia of the sigmoid flexure has had the most curious statements made concerning the presence or absence of a sac. See Lawrence, *loc. cit.*, p. 230 *et s.*

§ Sp. 2,139A.

‖ "Recherches sur les Cause des Hernies," p. 59.

has been made. But it seems reasonable to suggest that the presence of the cæcum or sigmoid flexure should always be suspected in large and long-standing herniæ,* and that precautions be accordingly taken in dealing with them.

Nor can much stress be laid upon the irreducibility of these herniæ. Although adhesions between the sac and its contents are not as universal as has been supposed, yet even in their absence these ruptures often refuse to go back, owing to a kind of impaction of the contents at the neck of the sac.

Cæcocele is much commoner in children than the older records would lead us to infer. Quite recently Mr. Silcock † has described a case, and referred to five others given by Mr. Wright, and Mr. Banks has met with another.‡ As usual, they are large and often irreducible, or attached to the testicle by a band; being also painful and very uncomfortable, and incapable of retention by a truss, they require a curative operation. Adhesions should be divided with extreme care, and instead of separating the intestine from its connection with the sac, a portion of the hinder wall of the latter may be reduced along with the intestines, and an effort may be made to secure the latter in the iliac fossa.

In acquired cæcocele both the local and the intra-abdominal conditions are so unfavourable that they are best left alone.

The Relation of the Spermatic Cord and its Constituents to the Sacs of Inguinal Herniæ.

The greater frequency with which operations are now performed upon inguinal herniæ justifies a reference to the distribution of the vas deferens and spermatic vessels upon their walls. Only inguinal hernia is spoken of in this paragraph, and the arrangement in cases of congenital hernia will be mentioned first. A glance at the anatomy of the processus vaginalis of a human

* Sp. 2,112, St. Bartholomew's Hosp. Museum, is a large femoral hernia of the left side, containing small intestine and sigmoid flexure.

† "Strangulated Cæcal Hernia in a Child; Radical Cure by Twisting the Neck of the Sac," *Brit. Med. Jour.*, Feb., 1888, p. 294.

‡ *Loc. cit.*, *Brit. Med. Jour.*, p. 1259.

fœtus at the eighth month of intra-uterine life (fig. 33*) shows how the various constituents of the cord are distributed. In the first place, they lie, as might be expected, at the back of the sac, and in the second, they keep their natural places. The latter can easily be inferred if we consider the origin and course of the various

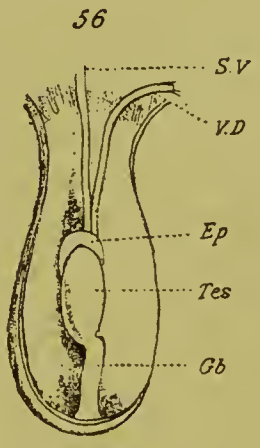


Fig. 33.

Processus Vaginalis about the end of the eighth month of intra-uterine life.—Ep., Epididymis. Gb., Gubernaculum Testis. S.V., Spermatic Vessels. Tes., Testicle. V.D., Vas Deferens.

constituents. The vas deferens, beginning at the epididymis, runs upwards along the inner side of the processus vaginalis, through the inner part of the internal abdominal ring, inwards over the brim of the pelvis, to reach the neck of the bladder (fig. 33). The spermatic vessels, on the contrary, do not bend abruptly inwards, but beginning at the epididymis, run upwards along the back of the processus vaginalis and outside the vas deferens, next to which the artery lies, and after passing through the lower and outer part of the internal abdominal ring, leave the vas

* Copied from fig. 56, plate iii , of author's "Hunterian Lectures on the Development and Transition of the Testicle."

towards their inner side, and ascend straight to their destinations. It has already been explained in this lecture that in their course up the back of the processus vaginalis, or sac of a congenital hernia, the spermatic vessels usually lie in a fold of peritoneum, the plica vascularis, and that this fold begins at the head of the epididymis, and runs upwards to the cæcum, vermiform appendix, ilium, mesentery, or sigmoid flexure; the vas deferens does not, as a rule, lie in this fold, but just to its inner side. When the constituents of the spermatic cord become separated from one another by distension of the processus vaginalis, as in hernia or hydrocele, they preserve the relations which have just been described. For instance, in the case of hernia of the sigmoid flexure * which has just been mentioned the vas lay upon the inner side of the sac, quite an inch apart from both the spermatic arteries and veins. Numerous examples of the same arrangement are mentioned by Lawrence, Scarpa, Cloquet, and others, and the displacement is always the same, although, as will be seen presently, it may differ in degree. Scarpa † remarks that in the process of separation the spermatic artery, which lies between the vas deferens and the spermatic veins, has a tendency to keep with the vas, and thus become separated from the veins. This is illustrated by specimens in our museum,‡ but there seems to be great variety in this respect. It is usual to attribute this separation of the constituents of the cord to the distension of the sac by its contents, but, as I have argued elsewhere, it may, in congenital cases, be merely a persistence and exaggeration of the fœtal arrangement.

In acquired hernia the relations of the constituents of the cord are, in the main, determined by similar considerations. But the separation is sometimes brought about in a different way. It may have been gathered from what has been said that the spermatic vessels and vas deferens join one another at an acute

* Sp. 2,139A, St. Bartholomew's Hosp. Museum. See also sp. 37, section R., St. Thomas's Hosp. Museum.

† *Loc. cit.*, p. 71.

‡ *Vide* sp. 2,132, St. Bartholomew's Hosp. Museum; also sp. 2,115.

angle, just as they arrive at the internal abdominal ring. Sometimes the rupture, during the process of its formation, introduces itself, like a wedge, into this angle, and thrusts the vas deferens and spermatic vessels apart, the former inwards, and the latter outwards. This seems to have occurred in a specimen in the museum of the London Hospital,* in which the sac lies between the vas and vessels, thrusting them far apart, and Lawrence mentions other cases which seem to have been of the same kind.† In direct inguinal hernia the cord does not acquire such intimate relations with the sac, and there is usually the following peculiarity in their mutual relations. The hernia protrudes straight through the abdominal wall at the lower end of the inguinal canal, but the spermatic cord keeps its usual place, and runs obliquely down the inguinal canal to join the outer side of the sac at an angle.‡ This arrangement can often be felt in thin subjects, and is not without diagnostic value.

Thus it may be said that the usual position of the spermatic cord is at the back of the sac, the vas deferens keeping its position towards the inner side, and the vessels lying externally. But it would be dangerous to rely upon the invariability of this arrangement. A specimen has already been figured in which the vas deferens deviated from its course and lay in front of the sac (fig. 32), and literature abounds with similar examples.§

The spermatic vessels themselves may run over the front of the sac, the vas remaining in its proper place, as is witnessed by a specimen of oblique inguinal hernia in the museum of St. Thomas's Hospital.‖ In this case the constituents of the cord are separated, the spermatic artery and vein running over the fore and outer part of the sac, whilst the vas deferens runs behind it.

In operating it is clearly safest to bear in mind that the vas

* Sp. Ag. 24.

† *Loc. cit.*, p. 211 *et s.*

‡ See Cooper's "Dictionary of Practical Surgery," p. 716.

§ See particularly the works of Camper, Cooper, and Lawrence; also Cooper's Dictionary, which gives a very good account of these separations.

‖ Series R., sp. 36.

deferens or spermatic vessels may lie in front of the sac and right in the way of the incision, and therefore before opening the sac an attempt should be made to ascertain their position and also that of the testicle. Sometimes the vessels and vas only escape the incision into the sac, to be divided with scissors which are being used to enlarge the opening; this danger is greatest below, because even in such cases as that figured (fig. 32) the vas lies behind the neck of the sac, but in front of its fundus.

Congenital Inguinal Hernia in a Female.

Specimens like that which is figured below are of some rarity (fig. 34). It is a small flask-shaped peritoneal sac, about two and

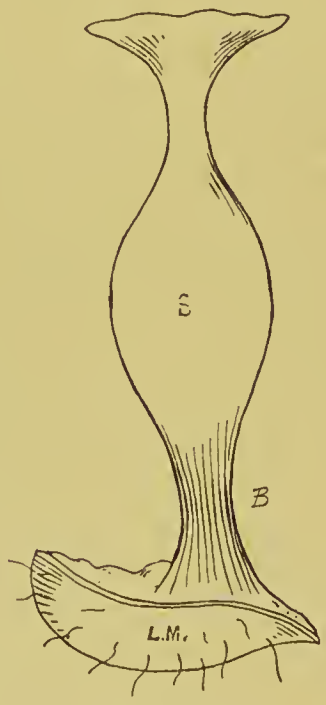


Fig. 34.
Congenital Inguinal Sac from a Female.—B., Fibrous Band. S., Sac. L.M., Labium Major.

a half inches long, and three-quarters of an inch in diameter in its widest part; it was found whilst dissecting the body of a

woman, who seemed about forty years of age. The sac communicated with the peritoneal cavity by a narrow neck, and its lower end, which was slightly conical, was fastened to the labium major by a thick and strong fibrous band.* The sac occupied the right inguinal canal, and just protruded from the external abdominal ring; its interior was thrown into a few folds, arranged longitudinally. When discovered it had no contents, and it is improbable that it had ever contained either bowel or omentum.

Although this specimen has no history, it is evidently of congenital origin and derived from the canal of Nuck, which Cloquet says is sometimes a little flask with a narrow neck, which communicates with the belly.† It would, therefore, have owed its origin to the action of the gubernaculum, and its anatomy lends confirmation to this view. Without doubt the band which united its lower end is the remains of that structure, and the conical shape of the end of the sac is of further significance. Its similarity to the true sac of an infantile hernia, which, as I have elsewhere endeavoured to show, owes its origin to the gubernaculum, is very striking. Our museums are ill provided with specimens of inguinal herniæ obtained from females. I am not aware of any specimen quite the same as this. There are two in the museum of St. Bartholomew's Hospital;‡ one is an oblique inguinal hernia, whose sac was bilocular, a part being contained in the inguinal canal, and a part in the labium, and these communicated with one another by a narrow canal, which passed through the external abdominal ring; the other is a sac, like a large tunica vaginalis testis, which lay in front of the left inguinal canal and at the upper part of the labium. It contained a quantity of fluid, the ovaries, and the end of the Fallopian tube. With the exception of these, our museums are singularly ill provided

* Mr. D'Arcy Power, who kindly examined this band, informs me that it consisted of fibrous tissue and fat. This specimen has been placed in the museum of St. Bartholomew's Hospital, No. 2,140E.

† "Recherches Anatomique," p. 41, quoted by Chelius, vol. ii., p. 65.

‡ Nos. 2,084 and 2,113.

with examples of inguinal hernia obtained from females, and authors have paid them little attention.

Sac of a Femoral Hernia containing a Laminated Calcareous Mass.

Whilst dissecting an aged female I found a femoral hernia* with a very delicate sac wall, and containing a hard, laminated, calcareous body (*vide* fig. 35). Except that it was very thin,

Fig. 35.
Sac of a Femoral Hernia, containing a Calcareous Mass.

the sac itself had no peculiarity. The calcareous mass was about half an inch long, and a third of an inch in one diameter, and rather less in the other. Its appearance in section was distinctly laminated, with a central white nucleus.

There was nothing to show how this stone had originated.

* St. Bartholomew's Hosp. Museum, sp. 2,115A.

Erichsen * says that "loose foreign bodies have occasionally been found in hernial sacs, and that they vary in size from a pea to a chestnut, and are mostly single. On section they are found to consist of a fatty central nucleus with a laminated fibrous envelope, usually of considerable thickness. They are apparently composed of one of the glandulæ epiploicæ, which has become detached, fallen loose into the peritoneal cavity, and become enveloped in plastic layers." The specimen which has been figured differs very much from such as these, in that it contained no fat and was hard and calcareous. There was nothing within the abdomen to indicate its origin, and it is merely mentioned as an interesting rarity.†

Infantile Hernia.

Before bringing these lectures to a close I propose to speak again upon the subject of infantile hernia. Specimens which have been met with during this investigation, and since I last wrote ‡ about these herniæ, seem to throw further light upon their pathology. Two varieties are, I think, generally accepted and recognised—one in which the true hernial sac descends behind an open processus vaginalis (fig. 36, B); and another in which it descends behind a processus vaginalis which is closed at the internal abdominal ring, and capacious everywhere else (fig. 36, A). Both of these varieties are well represented in our museums, particularly in those of Guy's and St. Thomas's. Lately I have placed in the museum of St. Bartholomew's Hospital § a specimen from the body of a child which shows the condition which predisposes to the second variety. In it the processus vaginalis is capacious below, and has the testicle protruding into it in the

* "Science and Art of Surgery," 7th edition, vol. ii., p. 615.

† There is a specimen of a femoral epiplocele in St. Thomas's Hospital Museum (series R., sp. 73) in which there is a nodule, about the size of a bean, on the front of the middle of the sac; it is very hard and dense, and contains a quantity of earthy matter. It is probably a calcified lymphatic gland. (See catalogue.)

‡ "Morbid Anatomy and Pathology of Encysted and Infantile Hernia," Med. Chi. Trans., vol. lxix., p. 479.

§ Sp. 2,081A.

usual manner, but it gradually dwindles as it ascends towards the internal ring, where it is abruptly closed. A small conical peritoneal pouch descends for rather more than half an inch behind its upper part, so that any intestine which might have found its way into it would have bulged into the upper part of the processus vaginalis.

But a specimen which has been described already (fig. 15) shows that there is a third variety of infantile hernia. In this case there are three serous sacs, which are all of developmental origin, and clear in their nature. There is the true

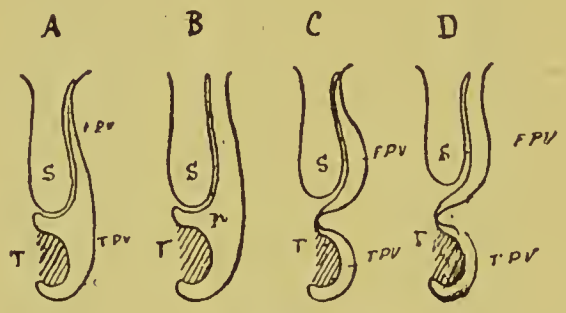


Fig. 36.

Diagramatic Representation of the varieties of Infantile Hernia.—F.P.V., Funicular Portion of Processus Vaginalis. T.P.V., Testicular Portion of Processus Vaginalis. S., Hernial Sac. T., Testicle.

hernial sac, which communicates with the peritoneum, and lies behind the upper part of the processus vaginalis, into which it bulges a little; the processus vaginalis is occluded at the internal abdominal ring, and its lower part is also divided off to form at tunica vaginalis testis. Thus this variety of infantile hernia is very like the second, except that there is a separate and distinct tunica vaginalis. The middle sac, that into which the true hernial sac bulges, is the same as the sac of a funicular hydrocele, and the existence of this variety affords a plausible explanation of such sacs as the one which was found in the case in which there was an inguinal hernia (fig. 22) and a retro-peritoneal hernia of the

vermiform appendix.* Two other specimens in the museum of St. Bartholomew's Hospital show by their construction that they belong to this variety; † except in point of size, their resemblance

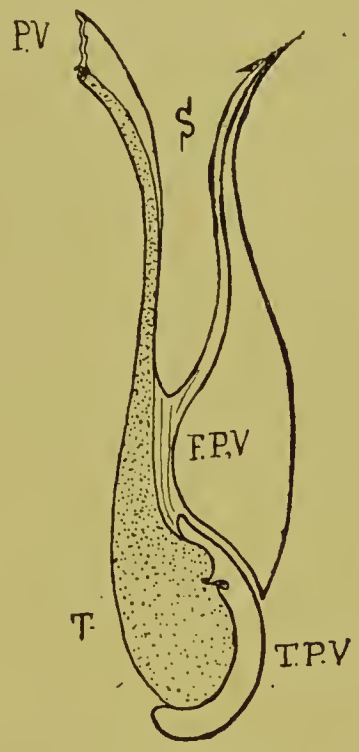


Fig. 16 (see also p. 45).

Semi-diagramatic Figure of Infantile Hernia—Child, Ten Weeks.—F.P.V., Funicular Portion of Processus Vaginalis. T.P.V., Testicular Portion of Processus Vaginalis or Tunica Vaginalis. S., Hernial Sac. P.V., Plica Vascularis. T., Testicle.

is very close, but in one of them there is a further pouch at the back of the true hernial sac. The formation of many of these secondary pouches seems to depend upon the course of the sper-

* In sp. 2,135, Museum of St. Bartholomew's Hospital, there was a hydrocele of both the testicular and funicular portions of the processus vaginalis, and combined with a hernia; but it differs from the condition described in that the hernia is of the acquired variety and protruding quite in front of the cord.

† Sp. 2,140C and 2,140D. These specimens and the next (2,140B) were shown by Mr. D'Arcy Power, at the Pathological Society, as card specimens (Path. Soc. Trans., vol. xxxvi., p. 216).

matic vessels and vas deferens, one or other of which may be found running along the free edge of the pouch. Not infrequently the plica vascularis forms the edge and front boundary of the secondary pouch, and sometimes it seems as if the recurrent branches of the spermatic artery had had to do with its formation.* In operating it is always wise to avoid cutting through folds at the back of the sacs of inguinal herniæ.

The fourth variety of infantile hernia (fig. 36, D) is suggested by a specimen † which I dissected some years ago, and which is described in my paper on encysted and infantile hernia. In this the true hernial sac (which is about two inches long and conical, with a band of muscular fibres attached to its end) lay behind the upper end of the processus vaginalis, which was patent, and opened into the abdomen; about an inch from its mouth the processus was occluded for a short way, but afterwards expanded and ran as far as the tunica vaginalis, with which it is in close relation. Therefore this specimen is not a perfect example of the fourth variety, which, however, I hope to come across.

Infantile herniæ are not particularly rare. Dr. Macewen ‡ mentions no less than five cases in his practice, and Mr. Wright § has described another. Mr. Wright's case occurred in a man of sixty-six, who had a strangulated inguinal hernia, which was curiously flaccid before the operation. "A fair-sized sac was found partly filled with fluid, but not tensely full; quite up at the top of the sac, and only just appearing out of the abdomen, was a little knuckle of tightly constricted bowel. There was a sac lying in front of this hernial sac, and containing a little fluid." This account does not give all the information we could have desired, and the position of the testis is not mentioned. Isolated pouches in connection with inguinal herniæ are by no means uncommon. In the next case which Mr. Wright describes a small

* Sp. 2,140E, St. Bartholomew's Hosp. Museum, suggests the possibility of this occurrence.

† St. Bartholomew's Hospital Museum, sp. 2,140B.

‡ *Loc. cit.*, p. 1266 *et s.*

§ Abstract from a clinical lecture on "Some of the Complications of Strangulated Hernia," by A. Wright, *Lancet*, March 30th, 1889.

serous pouch was cut into in opening the sac of a large inguinal hernia. This was considered to be an encysted hydrocele of the cord, and doubtless there were good reasons for this opinion, although nothing is said in the account concerning its relation to the cord, and although it was in front of the hernial sac. It seems not unreasonable to suppose that both this sac and the one found in the case with retro-peritoneal hernia (fig. 22), and possibly the sac found in the large cæcocele (fig. 29), were of the same nature as that figured in the third variety of infantile hernia (figs. 16 and 36, C). It is easy to comprehend how such a sac as that which is formed out of the funicular part of the processus vaginalis could be displaced during the enlargement of the true hernial sac. There is also reason to suppose that these isolated sacs may originate in other ways. In the case of cæcocele so clearly and minutely described by Professors Bennett and Cunningham * the sac was of the ordinary congenital variety, but there was another blind sac behind and to its outer side, and closely connected with the spermatic cord; those authors consider this sac to have been pulled down, like the sac of an infantile hernia, by the gubernaculum, and afterwards shut off from the peritoneum. There is an obvious difference between these two sorts of sacs, because that which originates from the processus vaginalis will tend to lie in front of the hernial sac, whilst the other will remain connected with the constituents of the cord and tend to lie behind.

Finally, before we conclude that all of these isolated sacs have a developmental origin it is to be remembered that the sacs of acquired herniæ may become occluded at their neck by the pressure of a truss,† and afterwards be displaced by the hernia continuing to protrude. Or the neck of the sac of either an acquired or congenital hernia may become occluded, as Demeaux ‡ has shown, by the cicatricial process which goes on in its neck. However, the morbid anatomy of the sacs affords clear evidence

* *Loc. cit.*, p. 16, plate ii., figs. 3 and 4.

† Sp. 2,089 and 2,090, St. Bartholomew's Hosp. Museum.

‡ "Recherches sur l'Evolution du Sac Herniare," Paris, 1842, p. 12.

of this origin, and the puckered remains of their orifice are plainly visible; and sometimes, as in cases mentioned by Demeaux,* they contain a part of their original contents, usually a piece of omentum. Also the relation between this sort of acquired isolated sac and the hernial sac is infinitely less intimate than in the congenital variety.

* *Loc. cit.*, p. 60.

TABLE GIVING DETAILS OF THE MEASUREMENT OF ONE HUNDRED SUBJECTS WITHOUT HERNIAL SACS OR HERNIÆ. (See also fig. 3 and fig. 12, Lect. I.)

The height of the flexura duodeno-jejunalis (mesentery) and of the transverse mesocolon is measured from the base line, the height of the end of the mesentery from the middle of the right crural arch, and the height of meso-sigmoidea from the centre of the left.

The following abbreviations have been used: + beyond; − short of; A.S.I., Anterior Superior Spine of Ilium; B.L., Base Line; C., Colon; Cæ., Cæcum; Cr.A , Crural Arches; Cr.P., Crest of Pubes; H.F., Hepatic Flexure; Gt.Om., Great Omentum; Hy.F., Hypogastric Fossæ; Il., Ilium; J., Jejunum; K., Kidney; L., Liver; L.Int., Large Intestine; M., Mesentery; M.S., Meso-sigmoidea; Py., Pylorus; S.F., Sigmoid Flexure; S.Int., Small Intestines; Sp.F., Splenic Flexure; S.P., Spine of Pubes; R., Right; L., Left; Tr.Mc., Transverse Mesocolon.

No. of Case.	Sex, Age, Height.	Length of Mesenteries.	Height of Mesenteries.	Excursion of Intestines.	
1	F. 3 wks. 21½ in.	M. 4 in. End of M. =o.	M. 1¾ in. Tr.Mc. 1¾ in.	Cæ.=R.Cr.A.+¾ in. Il.=R.Cr.A.+1½ in. Il.=L.Cr.A.+1 in. Il.=S.P.+½ in. J.=L.Cr.A.	Colons normal.
2	M. 4 wks. 17 in.	M. 3 in.	M. 1 in. Tr.Mc. 1¾ in.	Cæ =R.Cr.A.+1½ in. Il.=same. J.=L.Cr.A.	Cæcum very mobile.
3	F. 2 yrs. 2 ft. 10 in.	M. 5 in. End of M. 1½ in. Tr.Mc.,4½in. + Gt. Om. 7 in. M.S. 2½ in.	M. 2½ in. End of M. 3½ in. Tr.Mc. 2½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+2½ in. Il.=S.P.+2 in. Il.=L.Cr.A.+2½ in.	Colons normal.
4	M. 2 yrs. 2 ft. 8½ in.	M. 4½ in. Tr.Mc. 4½in. + Gt. Om. 7 in. M.S. 3 in. End of M. =o.	M. 2 in. End of M. 2½ in. Tr.Mc. 2 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1¾ in. Il.=Cr.P.+1 in. Il.=L.Cr.A. Gt.Om.=Cr.P.	Colons normal. Gt. Omentum very delicate.
5	M. 2 yrs. 2 ft. 11 in.	M. 6½ in. Tr.Mc. 5 in. + Gt. Om. 8½ in. M.S. 3½ in.	M. 3 in. End of M. 3½ in. Tr.Mc. 3½ in.	Cæ.=R.Cr.A. − 1 in. Il.=R.Cr.A.+1¼ in. Il.=Cr.P.+¾ in. Il.=L.Cr.A.+¾ in. M.S.=L.Cr.A. − 3 in. Gt.Om.=P.	Colons normal.
6	M. 3 yrs. 2 ft. 10½ in.	M. 4½ in.	M. 2 in. Tr.Mc. 2 in.	Cæ.=A.S.I. − 2 in. Il.=R.Cr.A.+2 in. Il.=L.Cr.A.+1 in. Il.=S.P.+1 in. J.=L.Cr.A.	Weight S.Int. 6½ oz. Weight L.Int. 3½ oz. Colons normal.

No. of Case.	Sex, Age, Height.	Length of Mesenteries.	Height of Mesenteries.	Excursion of Intestines.	
7	F. 3 yrs. 2 ft. 8 in.	M. 5 in.	M. 2 in. Tr.Mc. 2 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+$1\frac{1}{2}$ in. Il.=L.Cr.A.+$\frac{3}{4}$ in. Il.=S.P.	Weight S.Int. $8\frac{1}{2}$ oz. Weight L.Int. 4 ozs.
8	F. 3 yrs. 2 ft. 5 in.	M. 5 in.	M. 2 in. Tr.Mc. 2 in.	Cæ.=R.Cr.A.+$1\frac{1}{4}$ in. Il.=R.Cr.A.+$1\frac{1}{4}$ in. Il.=L.Cr.A.+$\frac{1}{2}$ in. Il.=S.P.+$\frac{1}{2}$ in. J.=R.Cr.A.	Colons normal.
9	F. 5 yrs. 3 ft. $1\frac{1}{2}$ in.	M. 5 in. End of M. $1\frac{1}{2}$ in. Tr.Mc. $4\frac{1}{2}$ in. + Gt. Om. 6 in. M.S. 3 in.	M. $2\frac{1}{2}$ in. End of M. 3 in. Tr.Mc. $2\frac{1}{2}$ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1 in. Il.=L.Cr.A.+$\frac{3}{4}$ in. Il.=S.P.	Colons normal.
10	M. 5 yrs. 3 ft. 6 in.	M. $5\frac{1}{2}$ in. M.S. 4 in. End of M.=$1\frac{1}{2}$ in.	M. $2\frac{1}{2}$ in. End of M. 3 in.	Cæ.=R.Cr.A.+1 in. Il.=R.Cr.A.+$1\frac{1}{2}$ in. Il.=L.Cr.A. Il.=S.P.+$\frac{1}{2}$ in., R. & L. S.F.=L.Cr.A.+$1\frac{1}{2}$ in.	Right colon had a short mesentery. Peritoneal depression at right internal abdominal ring. Hy. folds very prominent.
11	F. 9 yrs. 4 ft. 1 in.	M. 5 in.	M. 2 in. Tr.Mc. 2 in.	Cæ.=R.Cr.A.−$\frac{1}{2}$ in. Il.=R.Cr.A.+1 in. Il.=L.Cr.A. J.=L.Cr.A. S.F.=L.Cr.A.	Weight S.Int. 1 lb. 4 ozs. L.Int. $\frac{1}{4}$ lb. M. 1 oz. Right colon had a short mesocolon.
12	M. 9 yrs. 3 ft. $10\frac{1}{2}$ in.	M. $6\frac{1}{2}$ in. Tr.Mc. $4\frac{1}{2}$ in. + Gt. Om. 8 in.	M. $2\frac{1}{2}$ in. End of M. 3 in. Tr.Mc. 3 in.	Il.=R.Cr.A.+$1\frac{1}{2}$ in. Il.=Cr.P.+$1\frac{1}{8}$ in. Il.=L.Cr.A.+$\frac{3}{4}$ in.	Death from acute intestinal obstruction, due to band. Colons normal.
13	M. 11 yrs. 3 ft. 8 in.	M. 5 in.	M. 3 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A.+2 in. Il.=R.Cr.A.+2 in. Il.=L.Cr.A.+$1\frac{1}{2}$ in. Il.=S.P.+$1\frac{1}{2}$ in., R. & L. J.=L.Cr.A.+$\frac{1}{2}$ in.	Colons normal.
14	M. 12 yrs. 4 ft. $3\frac{1}{2}$ in.	M. 5 in.	M. $3\frac{1}{2}$ in. Tr.Mc. $3\frac{1}{2}$ in.	Cæ.=R.Cr.A.+$1\frac{1}{2}$ in. Il.=R.Cr.A.+$1\frac{1}{4}$ in. Il.=L.Cr.A.+1 in. Il.=S.P.+1 in., R. & L. S.F.=L.Cr.A.−3 in.	Colons normal.
15	F. 14 yrs. 4 ft. $6\frac{1}{2}$ in.	M. 6 in.	M. 4 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A.+$\frac{1}{2}$ in. Il.=R.Cr.A.+2 in. Il.=L.Cr.A.+$1\frac{1}{2}$ in. J.=L.Cr.A.	Colons normal.
16	F. 14 yrs. 4 ft. 10 in.	M. 5 in.	M. $3\frac{1}{2}$ in. Tr.Mc. 4 in.	Cæ.=R.Cr.A.+$\frac{1}{2}$ in. Il.=R.Cr.A. Il.=L.Cr.A.−1 in.	Colons normal.
17	F. 16 yrs. 5 ft. $1\frac{1}{2}$ in.	M. 6 in. End of M. =o. Tr.Mc. 6 in. + Gt. Om. 9 in. M.S.=o.	M. 4 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+$\frac{1}{2}$ in. Il.=S.P. Il.=L.Cr.A.	Colons normal.
18	F. 20 yrs. 5 ft. $4\frac{1}{2}$ in.	M. 6 in.	M. $3\frac{1}{4}$ in. Tr.Mc. $3\frac{1}{4}$ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1 in. J.=L.Cr.A.	Colons normal. S.Int. 1 lb. 10 ozs. L.Int. 1 lb. 15 ozs.

No. of Case.	Sex, Age, Height.	Length of Mesenteries.	Height of Mesenteries.	Excursion of Intestines.	
19	M. 20 yrs. 5 ft.	M. 6 in.	M. 4½ in. Tr.Mc. 4½ in.	Il.=R.Cr.A.+2 in. J.=L.Cr.A.	Hy. folds prominent. S.Int. 2¼ lbs. M. 2¼ ozs.
20	M. 21 yrs. 6 ft. 1 in.	M. 7 in.	M. 4 in. Tr.Mc. 4⅓ in.	Cæ.=R.Cr.A.+3 in. Il.=R.Cr.A.+1⅓ in. J.=L.Cr.A.+½ in.	Slight bulging of Hy.F. R. & L. Cæ. lay in pelvis. D. curved as low as bifurcation of aorta. Suspensory muscle of M. very strong.
21	F. 21 yrs. 5 ft. 2 in.	M. 7½ in. End of M. =o. Tr.Mc. 7 in. + Gt. Om. 14½ in.	M. 3½ in. End of M. 5 in. Tr.Mc. 3½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1¾ in. Il.=Cr.P.+1 in. Il.=L.Cr.A.+1 in. Gt.Om.=Cr.P.+2 in.	R.K. very moveable 1 in. below iliac crest. L.K. touched iliac crest. R.C. close to aorta and in front of R.K., would have been missed in lumbar colotomy. Cæcum very mobile.
22	M. 23 yrs. 5 ft. 3½ in.	M. 8 in. End of M. 4½ in. Tr.Mc. 9 in. + Gt. Om. 14 in. M.S. 3 in.	M. 4 in. End of M. 5 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A.+2⅔ in. Il.=R.Cr.A.+2½ in. Il.=S.P.+1½ in. Il.=L.Cr.A.+2 in. M.S.=L.Cr.A.−5 in.	Colons normal.
23	F. 26 yrs. 5 ft.	M. 6 in. End of M. =o. Tr.Mc. 6 in.	M. 4 in. End of M. 4 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A.−1 in. Il.=R.Cr.A. Il.=Cr.P. Il.=L.Cr.A.	Colons normal. Malignant disease of omentum.
24	M. 26 yrs. 5 ft. 7 in.	M. 5½ in.	M. 3½ in. Tr.Mc. 3½ in.	Il.=R.Cr.A.+1½ in. J.=L.Cr.A.	S.Int. 2 lbs. 8 ozs. L.Int. 1 lb. 2 ozs. R.Hy.F. deeper than L.
25	M. 28 yrs. 5 ft. 4½ in.	M. 7 in.	M. 3½ in. Tr.Mc. 3½ in.	Cæ.=R.Cr.A.+1½ in. Il.=R.Cr.A.+2½ in. Il.=S.P.+1 in. J.=L.Cr.A.−¾ in.	S.Int. 2 lbs. L.Int. 15 ozs. Cæcum very mobile.
26	M. 28 yrs. 6 ft.	M. 7½ in. End of M. 3 in. Tr.Mc. 8 in. + Gt. Om. 10 in. M.S. 3½ in.	M. 3½ in. End of M. 4 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A.+1 in. Il.=R.Cr.A.+1½ in. Il.=S.P.+1 in., R. and L. Il.=L.Cr.A.+1 in. M.S.=L.Cr.A.+2½ in.	Colons normal.
27	M. 28 yrs. 5 ft. 10½ in.	M. 8½ in. End of M. 2½ in. Tr.Mc. 8½ in.	M. 4 in. End of M. 4½ in. Tr.Mc. 4 in.	Cæ.=R.Cr.A.+2⅔ in. Il.=R.Cr.A.+2⅔ in. Il.=Cr.P.=1 in. Il.=L.Cr.A.+1 in.	Colons normal.
28	M. 30 yrs. 5 ft. 4½ in.	M. 5½ in.	M. 2½ in. Tr.Mc. 3 in.	Il.=R.Cr.A.+2 in. Il.=L.Cr.A.−½ in.	R.Hy.F. deep. A short mesentery with a low attachment.
29	M. 31 yrs. 5 ft. 6½ in.	M. 8 in. End of M. =o. Tr.Mc. 8½ in. + Gt. Om. 10½ in. M.S. 4 in.	M. 4½ in. End of M. 4 in. Tr.Mc. 4½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+2 in. Il.=S.P.+1 in. Il.=L.Cr.A.+2 in. M.S.=L.Cr.A.−4 in.	Colons normal. Died of chronic peritonitis.

No. of Case.	Sex, Age, Height.	Length of Mesenteries.	Height of Mesenteries.	Excursion of Intestines.	
30	M. 32 yrs. 5 ft. 4½ in.	M. 7 in. End of M. =0. Tr.Mc. 5 in.	M. 4 in. End of M. 4½ in. Tr.Mc. 4¼ in.	Cæ.=R.Cr.A. — 2 in. Not ascertained because of adhesions.	Colons normal. Death, chronic peritonitis.
31	F. 32 yrs. 5 ft. 6 in.	M. 7 in.	M. 3 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A.+3⅓ in. Cæ.=S.P.+3 in. Il.=R.Cr.A.+¾ in. Il.=L.Cr.A. J.=L.Cr.A. S.F.=L.Cr.A.	Tight lacing. Py. 3½ in. below B.L. Cæ. very mobile and lay in pelvis. R.C. has a short mesentery. R.K. 2½ in. below iliac crest. L.K. 1 in. below iliac crest.
32	M. 33 yrs. 5 ft. 8 in.	M. 6 in. Tr.Mc. 5½ in. + Gt. Om. 8 in.	M. 4 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A. Il.=R.Cr.A. Il.=L.Cr.A. Il.=Cr.P. — 1 in.	Colons normal. Great ascites.
33	M. 34 yrs. 5 ft. 7 in.	M. 7½ in.	M. 4 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A. Il.=R.Cr.A. J.=L.Cr.A. — 2 in.	Colons normal. S.Int. 2 lb. 14 oz. L.Int. 1 lb. 10 oz.
34	M. 35 yrs. 5 ft. 6½ in.	M. 8 in. Tr.Mc. 6 in. + Gt. Om. 11½ in. M.S.=o.	M. 3½ in. End of M. 4 in. Tr.Mc. 3½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1 in. Il.=Cr.P. Il.=L.Cr.A. Gt.Om.=Cr.P. M.S.=L.Cr.A.+3 in.	Colons normal.
35	M. 35 yrs. 5 ft. 4½ in.	M. 7½ in.	M. 2½ in. Tr.Mc. 2½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+2½ in. Il.=L.Cr.A.+1 in. Il.=S.P.	Colons normal. A capacious pelvis.
36	M. 36 yrs. 5 ft. 2 in.	M. 5½ in. Tr.Mc. 6¾ in. + Gt. Om. 11 in.	M. 4¼ in. Tr.Mc. 4½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+2 in. Il.=Cr.P.+1½ in. Il.=L.Cr.A.+1½ in.	H.F.=B.L. Large pyonephrosis.
37	M. 36 yrs. 5 ft. 11 in.	M. 5½ in.	M. 3½ in. Tr.Mc. 3½ in.	Il.=R.Cr.A. Il.=L.Cr.A. — ½ in.	S.Int. 2 lb. 10 oz Colons normal.
38	F. 36 yrs. 4 ft. 11 in.	M. 7 in.	M. 3 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A.+2½ in. Il.=R.Cr.A.+3 in. Il.=L.Cr.A.	Colons normal. S.Int. 1¾ lb. L.Int. 1¼ lb.
39	F. 37 yrs. 5 ft. 1 in.	M. 7 in. End of M. =o. Tr.Mc. 6 in. + Gt. Om. 10 in. M.S. 3½ in.	M. 3 in. End of M. 4 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A. Il.=R.Cr.A. Il.=S.P. Il.=L.Cr.A. M.S.=L.Cr.A. — 3½ in.	Colons normal.
40	M. 37 yrs. 5 ft. 1 in.	M. 7 in. End of M. 2½ in. M.S. 5½ in.	M. 3 in. End of M. 3½ in. Tr.Mc. 3 in.	Cæ.=R.Cr.A.+1½ in. Il.=R.Cr.A.+3 in. Il.=L.Cr.A.+½ in. S.F.=L.Cr.A.+½ in. J.=L.Cr.A.+2 in.	
41	M. 39 yrs. 5 ft. 5 in.	M. 8 in.	M. 4½ in. Tr.Mc. 4½ in. loosely held.	Cæ.=R.Cr.A.+2 in. Il.=R.Cr.A.+2½ in. Il.=S.P.+2 in., R. and L. J.=L.Cr.A.	S.Int. 1 lb. 9 oz. Colons normal.

No. of Case.	Sex, Age, Height.	Length of Mesenteries.	Height of Mesenteries.	Excursion of Intestines.	
42	F. 39 yrs.	M. 6 in. End of M. =0. Tr.Mc. 5 in. + Gt. Om. 12 in.	M. 3¾ in. End of M. 3 in. Tr.Mc. 4¼ in.	Cæ.=R.Cr.A.+3 in. Il.=R.Cr.A.+1 in. Il.=S.P.+1 in. Il.=L.Cr.A.+½ in. S.F.=L.Cr.A.—2 in.	Colons normal. Great omentum long and slender.
43	M. 40 yrs. 5 ft. 9 in.	M. 6 in.	M. 3 in. Tr.Mc. 3 in.	Il.=R.Cr.A.+3 in. J.=L.Cr.A.+1 in.	S.Int. 1 lb. 12 oz. L.Int. 14 oz.
44	M. 40 yrs. 5 ft. 7½ in.	M. 6½ in.	M. 3¼ in. End of M. 3¼ in. Tr.Mc. 3¼ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1½ in. Il.=S.P. J.=L.Cr.A.	Bulging of R.Hy.F. Colons normal.
45	M. 40 yrs. 6 ft.	M. 8 in. Tr.Mc. 8 in. + Gt. Om. 13 in.	M. 3 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A+2 in. Il.=R.Cr.A.+2½ in. Gt.Om.=R.Cr.A.+2 in. Il.=S.P.+1 in. Gt.Om.=Sp.+2 in. Il.=L.Cr.A.+1¼ in.	Colons normal. Great omentum long and slender.
46	M. 40 yrs. 5 ft. 11½ in.	M. 8⅓ in. End of M. 2 in. Tr.Mc. 8 in. + Gt. Om. 10 in.	M. 4 in. End of M. 4 in. Tr.Mc. 4½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1½ in. Il.=Cr.P.+1 in. Il.=L.Cr.A.+1 in. S.F.=L.Cr.A.—3 in.	Deep Cong Hy.F., R. Colons normal. Great omentum very delicate and adherent to abdominal wall.
47	M. 41 yrs. 5 ft. 3½ in.	M. 7⅓ in. End of M. 4 in. Tr.Mc. 8 in. + Gt. Om. 12 in.	M. 4 in. End of M. 4 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A.+2 in. Il.=R.Cr.A.+1 in. Il.=Cr.P. Il.=L.Cr.A. M.S.=L.Cr.A.—2 in. Gt.Om.=Pubes.	Colons normal. Gt.Om. very thin.
48	F. 41 yrs. 5 ft.	M. 6½ in. Tr.Mc. 6 in.	M. 3¼ in. Tr.Mc. 3¼ in.	Cæ.=R.Cr.A. Il.=R.Cr.A. Il.=Cr.P. Il.=L.Cr.A.	Colons normal. Death from suppurative peritonitis.
49	M. 43 yrs. 5 ft. 7½ in.	M. 5 in.	M. 3 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+3 in. Il.=S.P.+½ in. J.=L.Cr.A.	Deep Cong Hy.F. Colons normal.
50	M. 43 yrs. 5 ft. 7 in.	M. 7 in. End of M. 2½ in. Tr.Mc.6½ in. + Gt. Om. 11 in.	M. 3 in. End of M.4½ in. Tr.Mc. 3 in.	Cæ.=R.Cr.A.+1½ in. Il.=R.Cr.A.+2½ in. Il.=Cr.P.+1½ in. Il.=L.Cr.A.+2 in.	H.F. below iliac crest. L. 2 in. below costal cartilages. Flexura duodenojejunalis in left nipple line; thus giving increased range to small intestines on same side. Colons normal.
51	F. 43 yrs. 5 ft. 2½ in.	M. 10 in. End of M. 2½ in. Tr.Mc. 7 in. + Gt. Om. 12 in. M.S. 6 in.	M. 3½ in. End of M.4½ in. Tr.Mc. 3½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+3 in. Il.=S.P.+2 in. Il.=L.Cr.A.+2½ in. Gt.Om.=Pubes.	Colons normal. Abdomen very protuberant.
52	M. 44 yrs. 4 ft. 4 in.	M. 7½ in.	M. 4½ in. Tr.Mc. 4½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A. Il.=L.Cr.A. J.=L.Cr.A.	Colons normal.

No. of Case.	Sex, Age, Height.	Length of Mesenteries.	Height of Mesenteries.	Excursion of Intestines.	
53	F. 45 yrs. 4 ft. 11 in.	M. 6 in.	M. 2 in. Tr.Mc. $3\frac{1}{4}$ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+$\frac{3}{4}$ in. Il.=S.P.+$\frac{1}{2}$ in., R. Il.=S.P., L. Il.=L.Cr.A. − $1\frac{1}{2}$ in.	Colons normal. Although the attachment of M. is so low, yet it is strongly held.
54	F. 45 yrs.	M. $6\frac{1}{2}$ in.	M. 3 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A.+$\frac{1}{2}$ in. Il.=R.Cr.A.+$2\frac{1}{2}$ in. Il.=S.P., R.+1 in. Il.=L.Cr.A.+1 in. S.F.=L.Cr.A.+2 in.	Right lobe of L. elongated, and H.F. depressed into iliac fossa. Stomach depressed and lesser omentum elongated. Stomach at level of B.L. Colons otherwise normal.
55	F. 46 yrs. 5 ft. 8 in.	M. 7 in.	M. 3 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.	Colons normal. Duodenum curves 2 in. below B.L. Liver enlarged 7 in. below ensiform cartilage. Pelvis so large that it alters measurements.
56*	M. 46 yrs. 5 ft. 11 in.	M. $5\frac{1}{2}$ in. M.S. $5\frac{1}{2}$ in.	M. 2 in., strongly held. Tr.Mc. $5\frac{1}{2}$ in. M. S.=L.Cr.A. − $2\frac{1}{2}$ in.	Cæ.=R.Cr.A. Il.=R.Cr.A. Il.=Sp. − 1 in. Il.=L.Cr.A. S.F.=L.Cr.A.+$2\frac{1}{2}$ in.	There is $3\frac{1}{2}$ in. between the flexura duodeno-jejunalis and mesentery of transverse colon. Very severe genu valgum. Mesentery was strongly held.
57	M. 47 yrs. 5 ft. 8 in.	M. 7 in.	M. 4 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+$1\frac{1}{2}$ in. J.=L.Cr.A.	Colons normal. Liver enormously enlarged by melanotic sarcoma.
58	F. 48 yrs. 4 ft. 11 in.	M. 6 in.	M. $3\frac{3}{4}$ in. Tr.Mc. $3\frac{3}{4}$ in.	Cæ.=R.Cr.A. − 2 in. Il.=R.Cr.A.+$1\frac{1}{4}$ in. J.=L.Cr.A.	Colons normal. Death from acute peritonitis, due to ruptured ovarian cyst. Small int. 10 ft. long. Large int. 3 ft. 6 in. Small int. 1 lb. 9 oz. Large int. 15 oz.
59	M. 48 yrs. 5 ft. 7 in.	M. $7\frac{1}{2}$ in. End of M. =0. Tr.Mc. 7 in. + Gt. Om. $12\frac{1}{2}$ in. M.S. 4 in.	M. $3\frac{1}{4}$ in. End of M. $4\frac{1}{2}$ in. Tr.Mc. $3\frac{1}{4}$ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+2 in. Il.=S.P.+1 in. Il.=L.Cr.A.=$1\frac{1}{2}$ in. M.S.=L.Cr.A. − 4 in. Gt.Om.=Pubes.	Colons normal.
60	F. 48 yrs. 5 ft. 6 in.	M. 9 in.	M. 2 in. Tr.Mc. 2 in.	Cæ.=R.Cr.A.+$1\frac{1}{2}$ in. Il.=R.Cr.A.+4 in. Il.=L.Cr.A.+$1\frac{1}{2}$ in. J.=L.Cr.A.=$\frac{1}{2}$ in.	Slight iliac bulging. Tight lacing. Elongation of mesentery. H.F. and Py.=B.L.
61	F. 49 yrs. 5 ft. 7 in.	M. $8\frac{1}{4}$ in. Tr.Mc. 7 in. + Gt. Om. 12 in.	M. $3\frac{1}{2}$ in. Tr.Mc. $3\frac{1}{2}$ in.	Cæ.=R.Cr.A.+2 in. Il.=R.Cr.A.+$2\frac{1}{2}$ in. Il.=Cr.P.+$1\frac{1}{2}$ in. Il.=L.Cr.A.+2 in.	Right lobe of L. touches iliac crest. R.K.=iliac crest. L.K. normal. Colons normal.

No. of Case.	Sex, Age, Height.	Length of Mesenteries.	Height of Mesenteries.	Excursion of Intestines.	
62	M. 49 yrs. 5 ft. 10½ in.	M. 7½ in. End of M. =o. Tr.Mc. 7 in. + Gt. Om. 9 in.	M. 4 in. End of M. 4 in. Tr.Mc. 4½ in.	Cæ.=R.Cr.A.+3 in. Il.=R.Cr.A.+2 in. Il.=S.P. 1½ in. Il.=L.Cr.A.+1½ in.	Cæcum in pelvis. Colons normal. Large tumour of L.K. R.K. hypertrophied and touches iliac crest.
63	M. 5 ft. 4 in.	M. 6 in.	M. 5 in. Tr.Mc. 5 in.	Il.=R.Cr.A.+2 in. J.=L.Cr.A. S.F.=L.Cr.A.+1½ in.	Deep Cong. Hy.F., right. Colons normal.
64	F. 5 ft. 2⅓ in.	M. 7 in.	M. 2¼ in. Tr.Mc. 2¼ in.	Cæ.=R.Cr.A.+1 in. Il.=R.Cr.A.+1½ in. Il.=S.P. J.=L.Cr.A.	Left colon has a mesentery 2 in. long. H.F.=iliac crest. R.K.=iliac crest. Pelvis capacious and full of intestines.
65	M. 5 ft. 7 in.	M. 5½ in.	M. 3 in. Tr.Mc. 4½ in.	Cæ.=R.Cr.A.+⅛ in. Il.=R.Cr.A.+2⅞ in. J.=L.Cr.A.	Colons normal.
66	M. 50 yrs. 5 ft. 2½ in.	M. 6½ in.	M. 2 in. Tr.Mc. 3½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+½ in. Il.=S.P., R. Il.=L.Cr.A. S.F.=L.Cr.A. — 2½ in.	Middle and external deep folds being prominent. Colons normal.
67	M. 50 yrs. 5 ft. 10 in.	M. 9 in. End of M. 2 in. Tr.Mc. 8 in. + Gt. Om. 10 in.	M. 2½ in. End of M. 4 in. Tr.Mc. 2½ in.	Cœ.=R.Cr.A. Il.=R.Cr.A.+3 in. Il.=L.Cr.A.+3 in. Gt.Om.=S.P.,R.+1⅓in.	H.F.=iliac crest. R.K.=iliac crest. Rest of colons and L.K. normal. Curve of duodenum 1 in. below B.L.
68	F. 54 yrs. 5 ft. 3½ in.	M. 7½ in. End of M. =o. Tr.Mc. 7½ in. + Gt. Om. 11 in.	M. 4 in. End of M. 4 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1½ in. Il.=S.P.+1 in. Il.=L.Cr.A.+1 in. Gt.Om.=S.P.+3 in.	Colons normal.
69	M. 56 yrs. 5 ft. 3½ in.	M. 7 in. End of M. =o. Tr.Mc. 5 in. M.S.=o.	M. 3½ in. End of M. 4 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A. Il.=R.Cr.A. Il.=S.P. Il.=L.Cr.A. S.F.=L.Cr.A. — 4½ in.	Colons normal. Death from malignant growth of great omentum and other organs.
70	F. 56 yrs. 4 ft. 10 in.	M. 7½ in. End=o. Tr.Mc. 7 in. + Gt. Om. 11½ in.	M. 2 in. End of M. 5 in. Tr.Mc. 2 in.	Cæ.=R.Cr.A.+¾ in. Il.=R.Cr.A.+2 in. Il.=S.P.+1¼ in. Il.=L.Cr.A.+1½ in. S.F.=L.Cr.A. — 3½ in.	Faint femoral, bulgings both sides. H.F.=iliac crest. R.K. is 2. in below iliac crest. L.K. is 1 in. above iliac crest. Sp.F. opposite 12th rib. Liver 5 in. below gladiolus.
71	M. 59 yrs. 5 ft. 8 in.	M. 7 in. End=o. Tr.Mc. 8 in. + Gt. Om. 11½ in.	M. 3 in. End of M. 4 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+2 in. Il.=S.P.+1½ in. Il.=L.Cr.A.+1 in. M.S.=L.Cr.A.—3¼ in.	Slight bulging of right Hy.F., both middle & internal. Colons normal. Cæcum 4½ in. long

No. of Case.	Sex, Age, Height.	Length of Mesenterics.	Height of Mesenterics.	Excursion of Intestines.	
72	F. 59 yrs. 4 ft. 11½ in.	M. 7½ in. End=o. Tr.Mc. 6 in. + Gt. Om. 11½ in. M.S. 2 in.	M. 2¾ in. End of M. 4 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A.+3⅓ in. Il.=R.Cr.A.+2¼ in. Il.=S.P.+1 in. Il.=L.Cr.A.+1 in. S.F.=L.Cr.A. — 2½ in.	Faint femoral depressions. H.F.=iliac crest. R.K. 1 in. below iliac crest. L.K. ½ in. above iliac crest. No tight lacing.
73	M. 5 ft. 7 in.	M. 9 in.	M. 3 in. Tr.Mc. 4 in.	Cæ.=R.Cr.A.+1 in. Il.=R.Cr.A.+2½ in. Il.=S.P.+½ in. Il.=L.Cr.A.+1½ in.	Colons normal. Right middle Hy.F. deep.
74	M. 6 ft.	M. 6 in.	M. 4½ in. Tr.Mc. 4½ in.	Cæ.=R.Cr.A. — 1 in. Il.=R.Cr.A. Il.=L.Cr.A.	Colons normal. A short mesentery, with high attachment and small range of excursion.
75	F. 5 ft. 1½ in.	M. 7½ in.	M. 3½ in. Tr.Mc. 3½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1 in. J.=L.Cr.A.	Short mesentery, with high attachment. Short excursion of intestines.
76	F. 5 ft.	M. 7 in.	M. 3 in. Tr.Mc. 3 in.	Il.=R.Cr.A.+3 in.	Colons normal. S.Int. 1 lb. 14 oz. L.Int. 1 lb. 4 oz.
77	M. 5 ft. 5½ in.	M. 7 in.	M. 3½ in. Tr.Mc. 3½ in.	Cæ.=R.Cr.A. — ½ in. Il.=R.Cr.A.+1½ in. Il.=L.Cr.A.+1 in. J.=L.Cr.A. — 1 in.	H.F. 1½ in. above B.L.
78	F. 5 ft.	M. 6¾ in. End 2 in. M.S. 4½ in.	M. 3⅜ in. End of M. 3¾ in. Tr.Mc. 3½ in.	Cæ.=R.Cr.A.+1½ in. Il.=R.Cr.A.+1½ in. Il.=L.Cr.A.+¾ in. S.F.=L.Cr.A.+2 in.	Deep Cong. Hy. F. Tight lacing. Pelvis capacious.
79	F. 5 ft. 4 in.	M. 7¾ in. M.S. 3 in.	M. 3 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A.+1½ in. Il.=R.Cr.A.+2 in. Il.=S.P.+1 in. Il.=L.Cr.A.+1½ in.	Tight lacing. R. and L.K. touch iliac crests. H.F. and S.F. low.
80	M. 5 ft. 8½ in.	M. 5½ in. End of M. =o. Tr.Mc. 4 in. + Gt. Om. 10½ in. M.S.=o.	M. 4⅜ in. End of M. 3 in. Tr.Mc. 5¾ in.	Cæ.=R.Cr.A. — 1½ in. Il.=R.Cr.A.+½ in. Il.=S.P. Il.=L.Cr.A. M.S.=L.Cr.A. — 1½ in. Gt.Om.=Cr.P.+1¼ in.	Colons normal. Ks. normal. Short mesentery, with high attachment and limited excursion of intestines.
81	F. 5 ft. 3 in.	M. 7 in. End of M. =o. Tr.Mc. 4 in. + Gt. Om. 11 in.	M. 3 in. End of M. 3 in. Tr.Mc. 3 in. M.S. 3½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1 in. Il.=S.P. Il.=L.Cr.A. S.F.=L.Cr.A.+2 in.	Chest constricted. Liver depressed. R.K. at iliac crest. L.K. is 1½ in. above iliac crest. Pelvis capacious.
82	M. 5 ft. 3½ in.	M. 7 in.	M. 3¼ in. Tr.Mc. 4 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1 in. Il.=S.P. Il.=L.Cr.A.+1 in. J.=L.Cr.A.	Colons normal.
83	M. 5 ft. 4 in.	M. 7 in. End of M. 2 in.	M. 3 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A.+3 in. Il.=R.Cr.A.+2 in. Il.=S.P.+1 in. Il.=L.Cr.A.+1 in.	Faint depressions, R. and L. Femoral rings. Abdominal walls very thick. R. colon had a mesentery 2½ in. long.

No. of Case.	Sex, Age, Height.	Length of Mesenteries.	Height of Mesenteries.	Excursion of Intestines.	
84	M.	M. 9 in.	M. $2\frac{1}{2}$ in. Tr.Mc. $3\frac{1}{3}$ in.	Cæ.=R.Cr.A.+1 in. Il.=R.Cr.A.+$2\frac{1}{3}$ in. Il.=S.P.+$1\frac{1}{2}$ in. Il.=L.Cr.A.+$2\frac{1}{3}$ in.	Colons normal. Large lipoma of right spermatic cord. Small lipoma of left cord.
85	M. 60 yrs.	M. $\frac{1}{4}$ in. End of M. $2\frac{1}{4}$ in. Tr.Mc. $6\frac{3}{4}$ in. +Gt.Om. 12 in.	M. $3\frac{3}{4}$ in. End of M. 4 in. Tr.Mc. $4\frac{1}{2}$ in. M.S. $3\frac{1}{2}$ in.	Cæ.=R.Cr.A.+$\frac{1}{2}$ in. Il.=R.Cr.A.+$\frac{3}{4}$ in. Il.=S.P. Il.=L.Cr.A.	Colons normal.
86	M. 60 yrs.	M. 7 in. End of M. =0. Tr.Mc. 5 in. + Gt.Om. 7 in. M.S.=0.	M. $2\frac{1}{2}$ in. End of M. $5\frac{1}{2}$ in. Tr.Mc. 3 in. M.S. $1\frac{3}{4}$ in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+1 in. Il.=S.P. Il.=L.Cr.A.+$\frac{1}{4}$ in.	Colons normal.
87	F. 60 yrs. 4 ft. 8 in.	M. $8\frac{3}{4}$ in. End of M. 3 in. Tr.Mc. 9 in. +Gt.Om. 13 in.	M. 4 in. End of M. $3\frac{1}{2}$ in. Tr.Mc. $4\frac{1}{2}$ in. S.F. $3\frac{1}{2}$ in.	Cæ.=R.Cr.A.+$2\frac{1}{2}$ in. Il.=R.Cr.A.+3 in. Il.=Pubes+$1\frac{1}{2}$ in. Il.=L.Cr.A.+2 in.	Faint depression, R.F. ring. H.F. at iliac crest. R.K. at iliac crest. Cæcum in pelvis. Tr. C. touches pubes, and Gt. Om. goes 3 in. beyond. ? Prolapsus uteri. Liver 4 in. below ribs.
88	M. 61 yrs. 5 ft. $1\frac{1}{2}$ in.	M. 7 in.	M. 3 in. Tr.Mc. $3\frac{1}{2}$ in.	Cæ.=R.Cr.A+$\frac{1}{2}$ in. Il.=R.Cr.A.+1 in. Il.=L.Cr.A. Il.=S.P.	Colons normal. S.Int. 1 lb. 8 oz. L.Int. 1 lb.
89	M. 61 yrs. 5 ft. 9 in.	M. $9\frac{1}{2}$ in. End of M. 5 in. Tr.Mc. $9\frac{1}{2}$ in. +Gt.Om. 12 in. M.S. 9 in.	M. $3\frac{1}{2}$ in. End of M. $4\frac{1}{2}$ in. Tr.Mc. $3\frac{1}{3}$ in. M.S. $4\frac{1}{3}$ in.	Cæ.=R.Cr.A.+1 in. Il.=R.Cr.A.+$3\frac{1}{2}$ in. Il.=S.P.+$2\frac{1}{3}$ in. Il.=L.Cr.A.+$2\frac{1}{2}$ in. S.F.=L.Cr.A.+$3\frac{1}{3}$ in. Gt.Om.=S.P.+2 in.	Colons normal. All the mesenteries are very long.
90	M. 63 yrs. 5 ft. $7\frac{1}{2}$ in.	M. $7\frac{1}{2}$ in. End of M. =0.	M. $2\frac{1}{2}$ in. Tr.Mc. 3 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+2 in. I.=L.Cr.A.	Hy.F. bulges. Colons normal. Root of M. strongly held.
91	M. 64 yrs. 4 ft. $10\frac{1}{2}$ in.	M. $6\frac{1}{2}$ in. End of M. =0. M.S.=0.	M. $2\frac{1}{2}$ in. Tr.Mc. $2\frac{1}{2}$ in. M.S. 3 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+2 in. Il.=L.Cr.A.+1 in.	Colons normal.
92	M. 65 yrs. 5 ft. 7 in.	M. 8 in. End of M. $3\frac{1}{2}$ in. M.S. $3\frac{1}{2}$ in.	M. $3\frac{1}{3}$ in. Tr.Mc. $3\frac{1}{2}$ in. M.S. $3\frac{1}{2}$ in.	Cæ.=R.Cr.A.+2 in. Il.=R.Cr.A.+2 in. Il.=L.Cr.A.+$1\frac{1}{2}$ in. I.=L.Cr.A.	Colons normal.
93	F. 65 yrs.	M. $5\frac{1}{2}$ in. End of M. $2\frac{1}{2}$ in.	M. $2\frac{1}{2}$ in. End of M. $2\frac{1}{2}$ in. Tr.Mc. $2\frac{3}{4}$ in.	Cæ.=R.Cr.A.+4 in. Il.=R.Cr.A.+$1\frac{1}{2}$ in. Il.=S.P.+$\frac{3}{4}$ in. Il.=L.Cr.A.+$1\frac{1}{2}$ in.	Cæcum 4 in. long. R.K. $\frac{1}{2}$ in. below iliac crest. L.K. 2 in. above iliac crest. Py. $1\frac{1}{2}$ in. above B.L. Curve of duodenum at B.L. Body very fat, except Gt.Om.

No. of Case.	Sex, Age, Height.	Length of Mesenteries.	Height of Mesenteries.	Excursion of Intestines.	
94	F. 69 yrs. 5 ft. 4½ in.	M. 8½ in. End of M. 2½ in. Tr.Mc. 8 in. +Gt.Om. 11 in. M.S.=0.	M. 3⅜ in. End of M. 3¼ in. Tr.Mc. 2¼ in.	Cæ.=R.Cr.A.+1 in. Il.=R.Cr.A.+2½ in. Il.=S.P.+2 in. Il.=L.Cr.A.+1 in. S.F.=L.Cr.A. − 2½ in. Gt.Om.=Pubes.	Slight bulging R. Hy.F. Colons normal.
95	M. 71 yrs. 5 ft. 2 in.	M. 7 in.	M. 3 in. Tr.Mc. 3 in.	Il.=R.Cr.A.+2½ in. J.=L.Cr.A.	Colons normal. S.Int. 2 lb. 6 oz. L.Int. 2 lb. 8 oz.
96*	M. 72 yrs. 5 ft. 6½ in.	M. 9 in.	M.=B.L. Tr.Mc.=B.L.	Cæ.=R.Cr.A.+3 in. Il.=R.Cr.A.+3 in. Il.=S.P.+2 in. Il.=L.Cr.A.+2½ in.	Slight femoral Pouch, R. and L. H.F. at iliac crest. R.K. 1 in. below iliac crest. L.K. 2 in. above iliac crest.
97	F. 75 yrs. 5 ft.	M. 6 in. End of M. =0. M.S. 6 in.	M. 4⅜ in. End of M. 4 in. Tr.Mc. 5¼ in. M.S. 3¾ in.	Cæ.=R.Cr.A. Il.=S.P. − 1 in. Il.=L.Cr.A.	
98	M. 79 yrs. 5 ft. 1 in.	M. 7 in. End of M. =0. M.S. 6 in.	M. 3 in. Tr.Mc. 3 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+½ in. Il.=S.P., R. Il.=S.P., L. − ½ in. Il.=L.Cr.A.+½ in. S.F.=L.Cr. A.+2 in.	Deep Cong. Hy.F. Colons normal.
99	F. 80 yrs. 4 ft. 7½ in.	M. 6½ in. Tr.Mc. 7 in. +Gt.Om. 8 in.	M. 3 in. End of M. 3½ in. Tr.Mc. 3 in. M.S. 3½ in.	Cæ.=R.Cr.A. Il.=R.Cr.A. Il.=S.P. Il.=L.Cr.A.	See paragraph on apparent lengthening of mesentery, Lect. I.
100	F. 89 yrs. 4 ft. 11½ in.	M. 7½ in.	M. 4½ in. Tr.Mc. 3 in.	Cæ.=R.Cr.A. Il.=R.Cr.A.+2 in. Il.=S.P. Il.=L.Cr.A.+2 in. L.=Cr.A.J.	Colons normal.

PRINTED BY HAZELL, WATSON, AND VINEY, LD., LONDON AND AYLESBURY.

October, 1889.

CATALOGUE OF WORKS

PUBLISHED BY

H. K. LEWIS

136 GOWER STREET, LONDON, W.C.

Established 1844.

SIR WILLIAM AITKEN, KNT., M.D., F.R.S.
Professor of Pathology in the Army Medical School.

ON THE ANIMAL ALKALOIDS, THE PTOMAINES, LEUCOMAINES, AND EXTRACTIVES IN THEIR PATHOLOGICAL RELATIONS. Second edition, Crown 8vo. [*Just ready.*

E. CRESSWELL BABER, M.B. LOND.
Surgeon to the Brighton and Sussex Throat and Ear Dispensary.

A GUIDE TO THE EXAMINATION OF THE NOSE, WITH REMARKS ON THE DIAGNOSIS OF DISEASES OF THE NASAL CAVITIES. With Illustrations, small 8vo, 5s. 6d.

G. GRANVILLE BANTOCK, M.D., F.R.C.S. EDIN.
Surgeon to the Samaritan Free Hospital for Women and Children.

I.

ON THE USE AND ABUSE OF PESSARIES. Second Edit., with Illustrations, 8vo, 5s.

II.

ON THE TREATMENT OF RUPTURE OF THE FEMALE PERINEUM IMMEDIATE AND REMOTE. Second Edition, with Illustrations, 8vo, 3s. 6d.

III.

A PLEA FOR EARLY OVARIOTOMY. Demy 8vo, 2s.

FANCOURT BARNES, M.D., M.R.C.P.
Physician to the Chelsea Hospital for Women; Obstetric Physician to the Great Northern Hospital, &c.

A GERMAN-ENGLISH DICTIONARY OF WORDS AND TERMS USED IN MEDICINE AND ITS COGNATE SCIENCES. Square 12mo, Roxburgh binding, 9s.

ASHLEY W. BARRETT, M.B. LOND., M.R.C.S., L.D.S.

Dental Surgeon to, and Lecturer on Dental Surgery and Pathology in the Medical School of, the London Hospital.

DENTAL SURGERY FOR GENERAL PRACTITIONERS AND STUDENTS OF MEDICINE. With Illustrations, cr. 8vo, 3s.

[LEWIS'S PRACTICAL SERIES.]

ROBERTS BARTHOLOW, M.A., M.D., LL.D.

Professor of Materia Medica and Therapeutics in the Jefferson Medical College of Philadelphia, &c., &c.

I.

A PRACTICAL TREATISE ON MATERIA MEDICA AND THERAPEUTICS. Seventh Edition, Revised and Enlarged, 8vo, 18s. [*Just published.*

II.

A TREATISE ON THE PRACTICE OF MEDICINE, FOR THE USE OF STUDENTS AND PRACTITIONERS. Fifth Edition, with Illustrations, large 8vo, 21s.

H. CHARLTON BASTIAN, M.A., M.D., F.R.S.

Examiner in Medicine at the Royal College of Physicians; Professor of the Principles and Practice of Medicine in University College, London; Physician to University College Hospital, &c.

PARALYSES: CEREBRAL, BULBAR, AND SPINAL. A MANUAL OF DIAGNOSIS FOR STUDENTS AND PRACTITIONERS. With numerous Illustrations, 8vo, 12s. 6d.

GEO. M. BEARD, A.M., M.D.

Fellow of the New York Academy of Medicine, &c.

AND

A. D. ROCKWELL, A.M., M.D.

Fellow of the New York Academy of Medicine, &c.

A PRACTICAL TREATISE ON THE MEDICAL AND SURGICAL USES OF ELECTRICITY. Including Localized and General Faradization; Localized and Central Galvanization; Franklinization; Electrolysis and Galvano-Cautery. Sixth Edition. With nearly 200 Illustrations, roy. 8vo, 28s. [*Just published.*

E. H. BENNETT, M.D., F.R.C.S.I.

Professor of Surgery, University of Dublin.

AND

D. J. CUNNINGHAM, M.D., F.R.C.S.I.

Professor of Anatomy and Chirurgery, University of Dublin.

THE SECTIONAL ANATOMY OF CONGENITAL CŒCAL HERNIA. With coloured plates, sm. folio, 5s. 6d.

A. HUGHES BENNETT, M.D., M.R.C.P.
Physician to the Hospital for Epilepsy and Paralysis, Regent's Park, and Assistant Physician to the Westminster Hospital.

I

A PRACTICAL TREATISE ON ELECTRO-DIAGNOSIS IN DISEASES OF THE NERVOUS-SYSTEM. With Illustrations, 8vo, 8s. 6d.

II.

ILLUSTRATIONS OF THE SUPERFICIAL NERVES AND MUSCLES, WITH THEIR MOTOR POINTS; a knowledge of which is essential in the Art of Electro-Diagnosis. (Extracted from the above). 8vo, paper cover, 1s. 6d.; cloth, 2s.

HORATIO R. BIGELOW, M.D.
Permanent Member of the American Medical Association; Fellow of the British Gynæcological Society, &c.

GYNŒCOLOGICAL ELECTRO-THERAPEUTICS. With an Introduction by Dr. Georges Apostoli. With Illustrations, demy 8vo, 8s. 6d.

DR. THEODOR BILLROTH.
Professor of Surgery in Vienna.

GENERAL SURGICAL PATHOLOGY AND THERAPEUTICS. In Fifty-one Lectures. A Text-book for Students and Physicians. With additions by Dr. Alexander von Winiwarter, Professor of Surgery in Luttich. Translated from the Fourth German edition with the special permission of the Author, and revised from the Tenth edition, by C. E. Hackley, A.M., M.D. Copiously illustrated, 8vo, 18s.

DRS. BOURNEVILLE AND BRICON.

MANUAL OF HYPODERMIC MEDICATION. Translated from the Second Edition, and Edited, with Therapeutic Index of Diseases, by ANDREW S. CURRIE, M.D. Edin., &c. With Illustrations, crown 8vo, 6s.

G. H. BRANDT, M.D.

I.

ROYAT (LES BAINS) IN AUVERGNE, ITS MINERAL WATERS AND CLIMATE. With Frontispiece and Map. Second edition, crown 8vo, 2s. 6d.

II.

HAMMAM R'IRHA, ALGIERS. A Winter Health Resort and Mineral Water Cure Combined. With Frontispiece and Map, crown 8vo, 2s. 6d.

GURDON BUCK, M.D.

CONTRIBUTIONS TO REPARATIVE SURGERY: Showing its Application to the Treatment of Deformities, produced by Destructive Disease or Injury; Congenital Defects from Arrest or Excess of Development; and Cicatricial Contractions from Burns. Illustrated by numerous Engravings, large 8vo, 9s.

MARY BULLAR & J. F. BULLAR, M.B. CANTAB., F.R.C.S.

RECEIPTS FOR FLUID FOODS. 16mo, 1s.

STEPHEN SMITH BURT, M.D.

Professor of Clinical Medicine and Physical Diagnosis in the New York Post-graduate School and Hospital.

EXPLORATION OF THE CHEST IN HEALTH AND DISEASE. With Illustrations, crown, 8vo, 6s.

DUDLEY W. BUXTON, M.D., B.S., M.R.C.P.

Administrator of Anæsthetics at University College Hospital and the Hospital for Women, Soho Square.

ANÆSTHETICS THEIR USES AND ADMINISTRATION. Crown 8vo, 4s. [LEWIS'S PRACTICAL SERIES.]

HARRY CAMPBELL, M.D., B.S. LOND., M.R.C.S.

Assistant Physician and Pathologist to the North-West London Hospital.

THE CAUSATION OF DISEASE: An exposition of the ultimate factors which induce it. Demy 8vo, 12s. 6d.

ALFRED H. CARTER, M.D. LOND.

Member of the Royal College of Physicians; Physician to the Queen's Hospital, Birmingham; late Examiner in Medicine for the University of Aberdeen, &c.

ELEMENTS OF PRACTICAL MEDICINE. Fifth Edition, crown 8vo, 9s. [*Just published.*

P. CAZEAUX.

Adjunct Professor in the Faculty of Medicine of Paris, &c.

AND

S. TARNIER.

Professor of Obstetrics and Diseases of Women and Children in the Faculty of Medicine of Paris.

OBSTETRICS: THE THEORY AND PRACTICE; including the Diseases of Pregnancy and Parturition, Obstetrical Operations, &c. Seventh Edition, edited and revised by ROBERT J. HESS, M.D., with twelve full-page plates, five being coloured, and 165 wood-engravings, 1081 pages, roy. 8vo, 35s.

FRANCIS HENRY CHAMPNEYS, M.A., M.D. OXON., F.R.C.P.

Obstetric Physician and Lecturer on Obstetric Medicine at St. George's Hospital: Examiner in Obstetric Medicine in the University of London, &c.

EXPERIMENTAL RESEARCHES IN ARTIFICIAL RESPIRATION IN STILLBORN CHILDREN, AND ALLIED SUBJECTS. Crown 8vo, 3s. 6d.

W. BRUCE CLARKE, M.A., M.B. OXON., F.R.C.S.

Assistant Surgeon to, and Senior Demonstrator of Anatomy and Operative Surgery at, St. Bartholomew's Hospital; Surgeon to the West London Hospital; Examiner in Surgery to the University of Oxford.

THE DIAGNOSIS AND TREATMENT OF DISEASES OF THE KIDNEY AMENABLE TO DIRECT SURGICAL INTERFERENCE. Demy 8vo, with Illustrations, 7s. 6d.

JOHN COCKLE, M.A., M.D.
Physician to the Royal Free Hospital.

ON INTRA-THORACIC CANCER. 8vo, 4s. 6d.

ALEXANDER COLLIE, M.D. ABERD., M.R.C.P. LOND.
Medical Superintendent of the Eastern Hospitals.

ON FEVERS: THEIR HISTORY, ETIOLOGY, DIAGNOSIS, PROGNOSIS, AND TREATMENT. Illustrated with Coloured Plates, crown 8vo, 8s. 6d. [LEWIS'S PRACTICAL SERIES.]

M. P. MAYO COLLIER, M.B., M.S. LOND., F.R.C.S. ENG.
Professor of Comparative Anatomy and Physiology at the Royal College of Surgeons, England, &c.

THE PHYSIOLOGY OF THE VASCULAR SYSTEM. Illustrations, 8vo, 3s. 6d.

WALTER S. COLMAN, M.B., M.R.C.P. LOND.
Pathologist and Registrar to the National Hospital for the Paralysed and Epileptic; Formerly Assistant to the Professor of Pathology in the University of Edinburgh.

SECTION CUTTING AND STAINING: A Practical Guide to the Preparation of Normal and Morbid Histological Specimens. Crown 8vo, 3s. [*Now ready.*

ALFRED COOPER, F.R.C.S.
Surgeon to the St. Mark's Hospital for Fistula and other Diseases of the Rectum.

A PRACTICAL TREATISE ON THE DISEASES OF THE RECTUM. Crown 8vo, 4s.

W. H. CORFIELD, M.A., M.D. OXON.
Professor of Hygiene and Public Health in University College, London.

DWELLING HOUSES: their Sanitary Construction and Arrangements. Second Edit., with Illustrations. Cr. 8vo, 3s. 6d.

EDWARD COTTERELL, M.R.C.S. ENG., L.R.C.P. LOND.
Late House Surgeon, University College Hospital.

ON SOME COMMON INJURIES TO LIMBS; their Treatment and After-treatment, including Bone-setting (so-called). With Illustrations, small 8vo, 3s. 6d.

CHARLES CREIGHTON, M.D.

I.

ILLUSTRATIONS OF UNCONSCIOUS MEMORY IN DISEASE, including a Theory of Alteratives. Post 8vo, 6s.

II.

CONTRIBUTIONS TO THE PHYSIOLOGY AND PATHOLOGY OF THE BREAST AND LYMPHATIC GLANDS. New Edition with additional chapter, with wood-cuts and plate, 8vo, 9s.

III.

BOVINE TUBERCULOSIS IN MAN: An Account of the Pathology of Suspected Cases. With Chromo-lithographs and other Illustrations, 8vo, 8s. 6d.

H. RADCLIFFE CROCKER, M.D. LOND., B.S., F.R.C.P.
Physician, Skin Department, University College Hospital.

DISEASES OF THE SKIN; THEIR DESCRIPTION, PATHOLOGY, DIAGNOSIS, AND TREATMENT. With 76 Illustrations, 8vo, 21s. [*Now ready.*

EDGAR M. CROOKSHANK, M.B. LOND., F.R.M.S.
Professor of Bacteriology, King's College, London.

I.

MANUAL OF BACTERIOLOGY: being an Introduction to Practical Bacteriology. Illustrated with Coloured Plates from original drawings, and numerous Coloured Illustrations embodied in the text. Second Edition revised and enlarged, 8vo, 21s.

II.

PHOTOGRAPHY OF BACTERIA. Illustrated with 86 Photographs reproduced in autotype, and wood engravings, royal 8vo, 12s. 6d.

RIDLEY DALE, M.D., L.R.C.P. EDIN., M.R.C.S. ENG.

EPITOME OF SURGERY, being a complete compendium of the Science and Art of Surgery. Large 8vo, 10s. 6d.
[*Just Published.*

HERBERT DAVIES, M.D., F.R.C.P.
Late Consulting Physician to the London Hospital, and formerly Fellow of Queen's College Cambridge.

THE MECHANISM OF THE CIRCULATION OF THE BLOOD THROUGH ORGANICALLY DISEASED HEARTS. Edited by ARTHUR TEMPLER DAVIES, B.A. (Nat. Science Honours), M.B. Cantab., M.R.C.P.; Physician to the Royal Hospital for Diseases of the Chest; Examining Physician to the Royal National Hospital for Consumption, Ventnor. Crown 8vo, 3s. 6d. [*Just published.*

HENRY DAVIS, M.R.C.S. ENG.
Teacher and Administrator of Anæsthetics to St. Mary's and the National Dental Hospitals.

GUIDE TO THE ADMINISTRATION OF ANÆSTHE-TICS. Fcap. 8vo, 2s.

J. THOMPSON DICKSON, M.A., M.B. CANTAB.
Late Lecturer on Mental Diseases at Guy's Hospital.

THE SCIENCE AND PRACTICE OF MEDICINE IN RELATION TO MIND, the Pathology of the Nerve Centres, and the Jurisprudence of Insanity, being a course of Lectures delivered at Guy's Hospital. Illustrated by Chromo-lithographic Drawings and Physiological Portraits. 8vo, 14s.

HORACE DOBELL, M.D.
Consulting Physician to the Royal Hospital for Diseases of the Chest, &c.

I.

ON DIET AND REGIMEN IN SICKNESS AND Health and on the Interdependence and Prevention of Diseases and the Diminution of their Fatality. Seventh Edition, 8vo, 10s. 6d.

II.

AFFECTIONS OF THE HEART AND IN ITS NEIGHBOURHOOD. Cases, Aphorisms, and Commentaries. Illustrated by the heliotype process. 8vo, 6s 6d.

JOHN EAGLE.
Member of the Pharmaceutical Society.

A NOTE-BOOK OF SOLUBILITIES. Arranged chiefly for the use of Prescribers and Dispensers. 12mo, 2s. 6d.

JOHN ERIC ERICHSEN.
Ex-President of the Royal College of Surgeons; Surgeon Extraordinary to H.M. the Queen, etc.

MODERN SURGERY; its Progress and Tendencies. Being the Introductory Address delivered at University College at the opening of the Session 1873-74. Demy 8vo, 1s.

DR. FERBER.

MODEL DIAGRAM OF THE ORGANS IN THE THORAX AND UPPER PART OF THE ABDOMEN. With Letter-press Description. In 4to, coloured, 5s.

J. MAGEE FINNY, M.D. DUBL.
King's Professor of Practice of Medicine in School of Physic, Ireland, &c.

NOTES ON THE PHYSICAL DIAGNOSIS OF LUNG DISEASES. 32mo, 1s. 6d. [*Now ready.*

AUSTIN FLINT, M.D. LL.D.
Professor of Physiology and Physiological Anatomy in the Bellevue Hospital Medical College, New York; visiting Physician to the Bellevue Hospital, &c.

I.

A TEXT-BOOK OF HUMAN PHYSIOLOGY; Fourth edition, Illustrated by plates, and 316 wood engravings, large 8vo, 25s.

II.

THE PHYSIOLOGY OF THE SPECIAL SENSES AND GENERATION; (Being Vol. V. of the Physiology of Man). Roy. 8vo, 18s.

J. MILNER FOTHERGILL, M.D., M.R.C.P.
Late Physician to the City of London Hospital for Diseases of the Chest, Victoria Park, &c.

I.

A MANUAL OF DIETETICS. Large 8vo, 10s. 6d.

II.

THE HEART AND ITS DISEASES, WITH THEIR TREATMENT; INCLUDING THE GOUTY HEART. Second Edition, entirely re-written, copiously illustrated with woodcuts and lithographic plates. 8vo. 16s.

III.

INDIGESTION AND BILIOUSNESS. Second Edition, post 8vo, 7s. 6d.

IV.

GOUT IN ITS PROTEAN ASPECTS. Post 8vo, 7s. 6d.

V.

THE TOWN DWELLER: His Needs and His Wants. Post, 8vo. *[Just ready.*

VI.

HEART STARVATION. (Reprinted from the Edinburgh Medical Journal), 8vo, 1s.

FORTESCUE FOX, M.D. LOND.
Fellow of the Medical Society of London.

STRATHPEFFER SPA: Its Climate and Waters. With OBSERVATIONS HISTORICAL, MEDICAL, AND GENERAL, DESCRIPTIVE OF THE VICINITY. Crown 8vo, with Map and Illustrations, 2s. 6d.

ERNEST FRANCIS, F.C.S.
Demonstrator of Practical Chemistry, Charing Cross Hospital.

PRACTICAL EXAMPLES IN QUANTITATIVE ANA-lysis, forming a Concise Guide to the Analysis of Water, &c. Illustrated, fcap. 8vo, 2s. 6d.

ALFRED W. GERRARD, F.C.S.
Examiner to the Pharmaceutical Society; Teacher of Pharmacy and Demonstrator of Materia Medica at University College Hospital.

ELEMENTS OF MATERIA MEDICA AND PHAR-MACY. Crown 8vo, 8s. 6d. *[Just published.*

HENEAGE GIBBES, M.D.
Lecturer on Physiology and on Normal and Morbid Histology in the Medical School of Westminster Hospital; etc.

PRACTICAL HISTOLOGY AND PATHOLOGY. Third Edition, revised and enlarged, crown 8vo, 6s.

C. A. GORDON, M.D., C.B.
Deputy Inspector General of Hospitals, Army Medical Department.

REMARKS ON ARMY SURGEONS AND THEIR WORKS. Demy 8vo, 5s.

JOHN GORHAM, M.R.C.S.

TOOTH EXTRACTION: a Manual on the proper mode of extracting Teeth. Third Edition, fcap. 8vo, 1s. 6d. [*Now ready.*

JOHN W. S. GOULEY, M.D.

Surgeon to Bellevue Hospital.

DISEASES OF MAN: Data of their Nomenclature, Classification and Genesis. Crown 8vo, 14s.

W. R. GOWERS, M.D., F.R.C.P., M.R.C.S.

Physician to University College Hospital, &c.

DIAGRAMS FOR THE RECORD OF PHYSICAL SIGNS. In books of 12 sets of figures, 1s. Ditto, unbound, 1s.

J. B. GRESSWELL, M.R.C.V.S.

Provincial Veterinary Surgeon to the Royal Agricultural Society.

VETERINARY PHARMACOLOGY AND THERAPEUTICS. With an Index of Diseases and Remedies. Fcap. 8vo, 5s.

SAMUEL D. GROSS, M.D., LL.D., D.C.L. OXON.

Professor of Surgery in the Jefferson Medical College of Philadelphia.

A PRACTICAL TREATISE ON THE DISEASES, INJURIES, AND MALFORMATIONS OF THE URINARY BLADDER, THE PROSTATE GLAND, AND THE URETHRA. Third Edition, revised and edited by S. W. GROSS, A.M., M.D., Surgeon to the Philadelphia Hospital. Illustrated by 170 engravings, 8vo, 18s.

SAMUEL W. GROSS, A.M., M.D.

Surgeon to, and Lecturer on Clinical Surgery in, the Jefferson Medical College Hospital, and the Philadelphia Hospital, &c.

A PRACTICAL TREATISE ON TUMOURS OF THE MAMMARY GLAND: embracing their Histology, Pathology, Diagnosis, and Treatment. With Illustrations, 8vo, 10s. 6d.

ALLAN McLANE HAMILTON, M.D.

THE MODERN TREATMENT OF HEADACHES. Square 16mo, 2s. 6d. [*Just Published.*

WILLIAM A. HAMMOND, M.D.

Professor of Mental and Nervous Diseases in the Medical Department of the University of the City of New York, &c.

I.

A TREATISE ON THE DISEASES OF THE NERVOUS SYSTEM. Seventh edition, with 112 Illustrations, large 8vo, 25s.

II.

A TREATISE ON INSANITY. Large 8vo, 25s.

III.

SPIRITUALISM AND ALLIED CAUSES AND CONDITIONS OF NERVOUS DERANGEMENT. With Illustrations, post 8vo, 8s. 6d.

ALEXANDER HARVEY, M.A., M.D.

Emeritus Professor of Materia Medica in the University of Aberdeen; Consulting Physician to the Aberdeen Royal Infirmary, &c.

I.

FIRST LINES OF THERAPEUTICS; as based on the Modes and the Processes of Healing, as occurring Spontaneously in Disease; and on the Modes and the Processes of Dying, as resulting Naturally from Disease. In a series of Lectures. Post 8vo, 5s.

II.

ON THE FŒTUS IN UTERO AS INOCULATING THE MATERNAL WITH THE PECULIARITIES OF THE PATERNAL ORGANISM. In a series of Essays now first collected. Fcap. 8vo, 4s. 6d.

ALEXANDER HARVEY, M.D.

Emeritus Professor of Materia Medica in the University of Aberdeen, &c.

AND

ALEXANDER DYCE DAVIDSON, M.D., F.R.S. EDIN.

Late Regius Professor of Materia Medica in the University of Aberdeen.

SYLLABUS OF MATERIA MEDICA FOR THE USE OF STUDENTS, TEACHERS AND PRACTITIONERS. Based on the relative values of articles and preparations in the British Pharmacopœia. Eighth edition, 32mo, 1s. 6d.

K. M. HEANLEY.

Matron of Boston Cottage Hospital.

A MANUAL OF URINE TESTING. Compiled for the use of Matrons, Nurses, and Probationers. Post 8vo, 1s. 6d.

GRAILY HEWITT, M.D.

Professor of Midwifery and Diseases of Women in University College, Obstetrical Physician to University College Hospital, &c.

OUTLINES OF PICTORIAL DIAGNOSIS OF DISEASES OF WOMEN. Folio, 6s.

C. HIGGENS, F.R.C.S.

Ophthalmic Surgeon to Guy's Hospital; Leeturer on Ophthalmology at Guy's Hospital Medical School.

MANUAL OF OPHTHALMIC PRACTICE.
Crown 8vo, illustrations, 6s. [*Now ready.*
[LEWIS'S PRACTICAL SERIES.]

BERKELEY HILL, M.B. LOND., F.R.C.S.

Professor of Clinical Surgery in University College; Surgeon to University College Hospital and to the Lock Hospital.

THE ESSENTIALS OF BANDAGING. With directions for Managing Fractures and Dislocations; for administering Ether and Chloroform; and for using other Surgical Apparatus; with a Chapter on Surgical Landmarks. Sixth Edition, revised and enlarged, Illustrated by 144 Wood Engravings, crown 8vo, 5s.

BERKELEY HILL, M.B. LOND., F.R.C.S.

Professor of Clinical Surgery in University College; Surgeon to University College Hospital and to the Lock Hospital.

AND

ARTHUR COOPER, L.R.C.P., M.R.C.S.

Surgeon to the Westminster General Dispensary.

I.

SYPHILIS AND LOCAL CONTAGIOUS DISORDERS.
Second edition, entirely re-written, royal 8vo, 18s.

II.

THE STUDENT'S MANUAL OF VENEREAL DIS-EASES. Being a Concise Description of those Affections and of their Treatment. Fourth edition, post 8vo, 2s. 6d.

C. R. ILLINGWORTH, M.D. ED., M.R.C.S.

THE ABORTIVE TREATMENT OF SPECIFIC FE-BRILE DISORDERS BY THE BINIODIDE OF MERCURY. Crown 8vo, 3s. 6d.

SIR W. JENNER, Bart., M.D.

Physician in Ordinary to H.M. the Queen, and to H.R.H. the Prince of Wales.

THE PRACTICAL MEDICINE OF TO-DAY: Two Addresses delivered before the British Medical Association, and the Epidemiological Society, (1869). Small 8vo, 1s. 6d.

C. M. JESSOP, M.R.C.P.

Associate of King's College, London; Brigade Surgeon H.M. British Forces.

ASIATIC CHOLERA, being a Report on an Outbreak of Epidemic Cholera in 1876 at a Camp near Murree in India. With map, demy 8vo, 2s. 6d.

GEORGE LINDSAY JOHNSON, M.A., M.B., B.C. CANTAB.
Clinical Assistant, late House Surgeon and Chloroformist, Royal Westminster Ophthalmic Hospital, &c.

A NEW METHOD OF TREATING CHRONIC GLAUCOMA, based on Recent Researches into its Pathology. With Illustrations and coloured frontispiece, demy 8vo, 3s. 6d.

NORMAN KERR, M.D., F.L.S.
President of the Society for the Study of Inebriety; Consulting Physician, Dalrymple Home for Inebriates, etc.

INEBRIETY: its Etiology, Pathology, Treatment, and Jurisprudence. Second edition, Crown 8vo, 12s. 6d. [*Now ready.*

RUSTOMJEE NASERWANJEE KHORY, M.D. BRUX.
Member of the Royal College of Physicians.

THE PRINCIPLES AND PRACTICE OF MEDICINE Second edition, revised and much enlarged, 2 vols., large 8vo, 28s.

NORMAN W. KINGSLEY, M.D.S., D.D.S.
President of the Board of Censors of the State of New York; Member of the American Academy of Dental Science, &c.

A TREATISE ON ORAL DEFORMITIES AS A BRANCH OF MECHANICAL SURGERY. With over 350 Illustrations, 8vo, 16s.

J. WICKHAM LEGG, F.R.C.P.
Assistant Physician to Saint Bartholomew's Hospital, and Lecturer on Pathological Anatomy in the Medical School.

I.

ON THE BILE, JAUNDICE, AND BILIOUS DISEASES. With Illustrations in chromo-lithography, 719 pages, roy. 8vo, 25s.

II.

A GUIDE TO THE EXAMINATION OF THE URINE; intended chiefly for Clinical Clerks and Students. Sixth Edition, revised and enlarged, with Illustrations, fcap. 8vo, 2s. 6d.

III.

A TREATISE ON HÆMOPHILIA, SOMETIMES CALLED THE HEREDITARY HÆMORRHAGIC DIATHESIS. Fcap. 4to, 7s. 6d.

ARTHUR H. N. LEWERS, M.D. LOND., M.R.C.P. LOND.
Assistant Obstetric Physician to the London Hospital; Examiner in Midwifery and Diseases of Women to the Society of Apothecaries of London, &c.

A PRACTICAL TEXTBOOK OF THE DISEASES OF WOMEN. With Illustrations, crown 8vo, 8s. 6d. [*Now ready.*
[LEWIS'S PRACTICAL SERIES.]

LEWIS'S PRACTICAL SERIES.

Under this title Mr. LEWIS is publishing a Series of Monographs, embracing the various branches of Medicine and Surgery.

The volumes are written by well-known Hospital Physicians and Surgeons, recognized as authorities in the subjects of which they treat. The works are intended to be of a THOROUGHLY PRACTICAL nature, calculated to meet the requirements of the practitioner and student, and to present the most recent information in a compact and readable form.

HYGIENE AND PUBLIC HEALTH.

By LOUIS C. PARKES, M.D., D.P.H. LOND. UNIV., Fellow of the Sanitary Institute; Member of the Board of Examiners; Assistant Professor of Hygiene and Public Health at University College. etc. With numerous Illustrations, 8vo, 9s. [*Now ready.*

MANUAL OF OPHTHALMIC PRACTICE.

By C. HIGGENS, F.R.C.S., Ophthalmic Surgeon to Guy's Hospital; Lecturer on Ophthalmology at Guy's Hospital Medical School. With Illustrations, crown 8vo, 6s. [*Now ready.*

A PRACTICAL TEXTBOOK OF THE DISEASES OF WOMEN.

By ARTHUR H. N. LEWERS, M.D. Lond., M.R.C.P. Lond., Assistant Obstetric Physician to the London Hospital; Examiner in Midwifery and Diseases of Women to the Society of Apothecaries of London, etc. With Illustrations, crown 8vo, 8s. 6d.

ANÆSTHETICS THEIR USES AND ADMINISTRATION.

By DUDLEY W. BUXTON, M.D., B S., M.R.C.P., Administrator of Anæsthetics in University College Hospital and the Hospital for Women, Soho Square. Crown 8vo, 4s.

TREATMENT OF DISEASE IN CHILDREN: INCLUDING THE OUTLINES OF DIAGNOSIS AND THE CHIEF PATHOLOGICAL DIFFERENCES BETWEEN CHILDREN AND ADULTS.

By ANGEL MONEY, M.D., F.R.C.P., Assistant Physician to the Hospital for Children, Great Ormond Street, and to University College Hospital. Crown 8vo, 10s. 6d.

ON FEVERS: THEIR HISTORY, ETIOLOGY, DIAGNOSIS, PROGNOSIS, AND TREATMENT.

By ALEXANDER COLLIE, M.D. Aberd., Member of the Royal College of Physicians of London; Medical Superintendent of the Eastern Hospitals; Secretary of the Epidemiological Society for Germany and Russia. Illustrated with Coloured Plates, crown 8vo, 8s. 6d.

HANDBOOK OF DISEASES OF THE EAR FOR THE USE OF STUDENTS AND PRACTITIONERS.

By URBAN PRITCHARD, M.D. Edin., F.R.C.S. Eng., Professor of Aural Surgery at King's College, London; Aural Surgeon to King's College Hospital; Senior Surgeon to the Royal Ear Hospital. With Illustrations, crown 8vo, 4s. 6d.

A PRACTICAL TREATISE ON DISEASES OF THE KIDNEYS AND URINARY DERANGEMENTS.

By CHARLES HENRY RALFE, M.A., M.D. Cantab., Fellow of the Royal College of Physicians, London; Assistant Physician to the London Hospital; Examiner in Medicine to the University of Durham, etc., etc. With Illustrations, crown 8vo, 10s. 6d.

DENTAL SURGERY FOR GENERAL PRACTITIONERS AND STUDENTS OF MEDICINE.

By ASHLEY W. BARRETT, M.B. Lond., M.R.C.S., L.S.D., Dental Surgeon to, and Lecturer on Dental Surgery and Pathology in the Medical School of, the London Hospital. With Illustrations, cr. 8vo, 3s.

BODILY DEFORMITIES AND THEIR TREATMENT: A HANDBOOK OF PRACTICAL ORTHOPÆDICS.

By H. A. REEVES, F.R.C.S. Edin., Senior Assistant Surgeon and Teacher of Practical Surgery at the London Hospital; Surgeon to the Royal Orthopædic Hospital, &c. With numerous Illustrations, cr 8vo, 8s. 6d.

Further volumes will be announced in due course.

DR. GEORGE LEWIN.

Professor at the Fr. Wilh. University, and Surgeon-in-Chief of the Syphilitic Wards and Skin Disease Wards of the Charité Hospital, Berlin.

THE TREATMENT OF SYPHILIS WITH SUBCUTANEOUS SUBLIMATE INJECTIONS. Translated by DR. CARL PRŒGLE, and DR. E. H. GALE, late Surgeon United States Army. Small 8vo, 7s.

LEWIS'S POCKET CASE BOOK FOR PRACTITIONERS AND STUDENTS. Designed by A. T. BRAND, M.D. Roan, with pencil, 3s. 6d. *nett.*

LEWIS'S POCKET MEDICAL VOCABULARY. Over 200 pp., 32mo, roan, 3s. 6d.

T. R. LEWIS, M.B., F.R.S. ELECT, ETC.

Late Fellow of the Calcutta University, Surgeon-Major Army Medical Staff, &c.

PHYSIOLOGICAL AND PATHOLOGICAL RESEARCHES. Arranged and edited by SIR WM. AITKEN, M.D., F.R.S., G. E. DOBSON, M.B., F.R.S., and A. E. BROWN, B.Sc. Crown 4to, portrait, 5 maps, 43 plates including 15 chromo-lithographs, and 67 wood engravings, 30s. *nett.* [*Just Published.*

J. S. LOMBARD, M.D.

Formerly Assistant Professor of Physiology in Harvard College.

I.

EXPERIMENTAL RESEARCHES ON THE REGIONAL TEMPERATURE OF THE HEAD, under Conditions of Rest, Intellectual Activity and Emotion. With Illustrations, 8vo, 8s.

II.

ON THE NORMAL TEMPERATURE OF THE HEAD. 8vo, 5s.

WILLIAM THOMPSON LUSK, A.M., M.D.

Professor of Obstetrics and Diseases of Women in the Bellevue Hospital Medical College, &c.

THE SCIENCE AND ART OF MIDWIFERY. Third Edition, with numerous Illustrations, 8vo, 18s.

RAWDON MACNAMARA.

Professor of Materia Medica, Royal College of Surgeons, Ireland; Senior Surgeon to the Westmoreland (Lock) Government Hospital; Surgeon to the Meath Hospital, etc.

AN INTRODUCTION TO THE STUDY OF THE BRITISH PHARMACOPŒIA. Demy 32mo, 1s. 6d. [*Just published.*

JOHN MACPHERSON, M.D.

Inspector-General of Hospitals H.M. Bengal Army (Retired). Author of "Cholera in its Home," &c.

I.

ANNALS OF CHOLERA FROM THE EARLIEST PERIODS TO THE YEAR 1817. With a map. Demy 8vo, 7s. 6d.

II.

BATH, CONTREXEVILLE, AND THE LIME SUL- PHATED WATERS. Crown 8vo, 2s. 6d.

DR. V. MAGNAN.

Physician to St. Ann Asylum, Paris; Laureate of the Institute.

ON ALCOHOLISM, the Various Forms of Alcoholic Delirium and their Treatment. Translated by W. S. GREENFIELD, M.D., M.R.C.P. 8vo, 7s. 6d.

A. COWLEY MALLEY, B.A., M.B., B.CH. T.C.D.

PHOTO-MICROGRAPHY; including a description of the Wet Collodion and Gelatino-Bromide Processes, together with the best methods of Mounting and Preparing Microscopic Objects for Photo-Micrography. Second Edition, with Photographs and Illustrations, crown 8vo, 7s. 6d.

PATRICK MANSON, M.D., C.M.

Amoy, China.

THE FILARIA SANGUINIS HOMINIS; AND CER- TAIN NEW FORMS OF PARASITIC DISEASE IN INDIA, CHINA, AND WARM COUNTRIES. Illustrated with Plates and Charts. 8vo, 10s. 6d.

PROFESSOR MARTIN.

MARTIN'S ATLAS OF OBSTETRICS AND GYNÆCOLOGY. Edited by A. MARTIN, Docent in the University of Berlin. Translated and edited with additions by FANCOURT BARNES, M.D., M.R.C P., Physician to the Chelsea Hospital for Women; Obstetric Physician to the Great Northern Hospital; and to the Royal Maternity Charity of London, &c. Medium 4to, Morocco half bound, 31s. 6d. *nett.*

WILLIAM MARTINDALE, F.C.S.

Late Examiner of the Pharmaceutical Society, and late Teacher of Pharmacy and Demonstrator of Materia Medica at University College.

AND

W. WYNN WESTCOTT, M.B. LOND.

Deputy Coroner for Central Middlesex.

THE EXTRA PHARMACOPŒIA with the additions introduced into the British Pharmacopœia, 1885, with Medical References, and a Therapeutic Index of Diseases and Symptoms. Fifth Edition, revised with numerous additions, limp roan, med. 24mo, 7s. 6d.

WILLIAM MARTINDALE, F.C.S.

Late Examiner of the Pharmaceutical Society, &c.

COCA, COCAINE, AND ITS SALTS: their History, Medical and Economic Uses, and Medicinal Preparations. Fcap. 8vo, 2s.

MATERIA MEDICA LABELS.

Adapted for Public and Private Collections. Compiled from the British Pharmacopœia of 1885. The Labels are arranged in Two Divisions:—

Division I.—Comprises, with few exceptions, Substances of Organized Structure, obtained from the Vegetable and Animal Kingdoms.

Division II.—Comprises Chemical Materia Medica, including Alcohols, Alkaloids, Sugars, and Neutral Bodies.

On plain paper, 10s. 6d. *nett.* On gummed paper, 12s. 6d. *nett.*

*** Specimens of the Labels, of which there are over 450, will be sent on application.

S. E. MAUNSELL, L.R.C.S.I.

Surgeon-Major, Medical Staff.

NOTES OF MEDICAL EXPERIENCES IN INDIA PRINCIPALLY WITH REFERENCE TO DISEASES OF THE EYE. With Map, post 8vo 3s. 6d.

J. F. MEIGS, M.D.
Consulting Physician to the Children's Hospital, Philadelphia.

AND

W. PEPPER, M.D.
Lecturer on Clinical Medicine in the University of Pennsylvania.

A PRACTICAL TREATISE ON THE DISEASES OF CHILDREN. Seventh Edition, revised and enlarged, roy. 8vo, 28s.

Wm. JULIUS MICKLE, M.D., F.R.C.P. LOND.
Medical Superintendent, Grove Hall Asylum, London, &c.

I.

GENERAL PARALYSIS OF THE INSANE. Second Edition, enlarged and rewritten, 8vo, 14s.

II.

ON INSANITY IN RELATION TO CARDIAC AND AORTIC DISEASE AND PHTHISIS. Crown 8vo, 3s. 6d.

KENNETH W. MILLICAN, B.A. CANTAB., M.R.C.S.

THE EVOLUTION OF MORBID GERMS: A Contribution to Transcendental Pathology. Cr. 8vo, 3s. 6d.

ANGEL MONEY, M.D., F.R.C.P.
Assistant Physician to University College Hospital, and to the Hospital for Children, Great Ormond Street, &c.

I.

THE STUDENT'S TEXTBOOK OF THE PRACTICE OF MEDICINE. Fcap. 8vo, 6s. 6d. [*Just Published.*

II.

TREATMENT OF DISEASE IN CHILDREN: INCLUDING THE OUTLINES OF DIAGNOSIS AND THE CHIEF PATHOLOGICAL DIFFERENCES BETWEEN CHILDREN AND ADULTS. Crown 8vo, 10s. 6d.
[LEWIS'S PRACTICAL SERIES]

E. A. MORSHEAD, M.R.C.S., L.R.C.P.
Assistant to the Professor of Medicine in University College, London.

TABLES OF THE PHYSIOLOGICAL ACTION OF DRUGS. Fcap. 8vo, 1s.

A. STANFORD MORTON, M.B., F.R.C.S. ENG.
Surgeon to the Royal South London Ophthalmic Hospital.

REFRACTION OF THE EYE: Its Diagnosis, and the Correction of its Errors. Third Edition, with Illustrations, small 8vo. 3s.

C. W. MANSELL MOULLIN, M.A., M.D. OXON., F.R.C.S. ENG.
Assistant Surgeon and Senior Demonstrator of Anatomy at the London Hospital; formerly Radcliffe Travelling Fellow and Fellow of Pembroke College, Oxford.

SPRAINS; THEIR CONSEQUENCES AND TREATMENT. Crown 8vo, 5s.

PAUL F. MUNDÉ, M.D.
Professor of Gynecology at the New York Polyclinic; President of the New York Obstetrical Society and Vice-President of the British Gynecological Society, &c.

THE MANAGEMENT OF PREGNANCY, PARTURITION, AND THE PUERPERAL STATE, NORMAL AND ABNORMAL. Square 8vo, 3s. 6d.

WILLIAM MURRELL, M.D., F.R.C.P.
Lecturer on Pharmacology and Therapeutics at Westminster Hospital; late Examiner in Materia Medica to the Royal College of Physicians of London, etc.

I.

MASSOTHERAPEUTICS, OR MASSAGE AS A MODE OF TREATMENT. Fourth edition, with Illustrations, crown 8vo, 4s. 6d. [*Just published.*

II.

WHAT TO DO IN CASES OF POISONING. Sixth edition, royal 32mo, 3s. 6d. [*Just published.*

III.

NITRO-GLYCERINE AS A REMEDY FOR ANGINA PECTORIS. Crown 8vo, 3s. 6d.

DR. FELIX von NIEMEYER.
Late Professor of Pathology and Therapeutics; Director of the Medical Clinic of the University of Tübingen.

A TEXT-BOOK OF PRACTICAL MEDICINE, WITH PARTICULAR REFERENCE TO PHYSIOLOGY AND PATHOLOGICAL ANATOMY. Translated from the Eighth German Edition by special permission of the Author, by GEORGE H. HUMPHERY, M.D., and CHARLES E. HACKLEY, M.D. Revised edition, 2 vols. large 8vo, 36s.

GEORGE OLIVER, M.D., F.R.C.P.

I.

THE HARROGATE WATERS: Data Chemical and Therapeutical, with notes on the Climate of Harrogate. Addressed to the Medical Profession. Crown 8vo, with Map of the Wells, 3s. 6d.

II.

ON BEDSIDE URINE TESTING: a Clinical Guide to the Observation of Urine in the course of Work. Fourth Edition, fcap. 8vo, 3s. 6d. [*Just published.*

SAMUEL OSBORN, F.R.C.S.

Assistant-Surgeon to the Hospital for Women; Surgeon Royal Naval Artillery Volunteers

I.

AMBULANCE LECTURES: FIRST AID. With Illustrations, fcap. 8vo, 1s. 6d.

II.

AMBULANCE LECTURES: NURSING. With Illustrations, fcap. 8vo, 1s. 6d.

WILLIAM OSLER, M.D., F.R.C.P. LOND.

Professor of Clinical Medicine in the University of Pennsylvania, &c.

THE CEREBRAL PALSIES OF CHILDREN. A Clinical Study from the Infirmary for Nervous Diseases, Philadelphia. Demy 8vo, 5s. [*Just Published.*

ROBERT W. PARKER.

Surgeon to the East London Hospital for Children, and to the Grosvenor Hospital for Women and Children.

I.

TRACHEOTOMY IN LARYNGEAL DIPHTHERIA, AFTER TREATMENT AND COMPLICATIONS. Second Edition. With Illustrations, 8vo, 5s.

II.

CONGENITAL CLUB-FOOT; ITS NATURE AND TREATMENT. With special reference to the subcutaneous division of Tarsal Ligaments. 8vo, 7s. 6d.

LOUIS C. PARKES, M.D., D.P.H. LOND. UNIV.

Fellow of the Sanitary Institute; Member of the Board of Examiners; Assistant Professor of Hygiene and Public Health at University College, &c.

HYGIENE AND PUBLIC HEALTH. With numerous Illustrations, crown 8vo, 9s. [Lewis's Practical Series.]
[*Just Published.*

JOHN S. PARRY, M.D.
Obstetrician to the Philadelphia Hospital, Vice-President of the Obstetrical and Pathological Societies of Philadelphia, &c.

EXTRA-UTERINE PREGNANCY; Its Causes, Species, Pathological Anatomy, Clinical History, Diagnosis, Prognosis and Treatment. 8vo, 8s.

E. RANDOLPH PEASLEE, M.D., LL.D.
Late Professor of Gynæcology in the Medical Department of Dartmouth College; President of the New York Academy of Medicine, &c., &c.

OVARIAN TUMOURS: Their Pathology, Diagnosis, and Treatment, especially by Ovariotomy. Illustrations, roy. 8vo, 16s.

G. V. POORE, M.D., F.R.C.P.
Professor of Medical Jurisprudence, University College; Assistant Physician to, and Physician in charge of the Throat Department of, University College Hospital.

LECTURES ON THE PHYSICAL EXAMINATION OF THE MOUTH AND THROAT. With an Appendix of Cases. 8vo, 3s. 6d.

R. DOUGLAS POWELL, M.D., F.R.C.P., M.R.C.S.
Physician Extraordinary to H.M. the Queen; Physician to the Middlesex Hospital and Physician to the Hospital for Consumption and Diseases of the Chest at Brompton.

DISEASES OF THE LUNGS AND PLEURÆ, INCLUD-ING CONSUMPTION. Third edition, entirely rewritten and enlarged. With coloured plates and wood engravings, 8vo, 16s.

URBAN PRITCHARD, M.D. EDIN., F.R.C.S. ENG.
Professor of Aural Surgery at King's College, London; Aural Surgeon to King's College Hospital; Senior Surgeon to the Royal Ear Hospital.

HANDBOOK OF DISEASES OF THE EAR FOR THE USE OF STUDENTS AND PRACTITIONERS. With Illustrations, crown 8vo, 4s. 6d. [Lewis's Practical Series.]

CHARLES W. PURDY, M.D. (QUEEN'S UNIV.)
Professor of Genito-Urinary and Renal Diseases in the Chicago Polyclinic, &c., &c.

BRIGHT'S DISEASE AND THE ALLIED AFFECTIONS OF THE KIDNEYS. With Illustrations, large 8vo, 8s. 6d.

CHARLES HENRY RALFE, M.A., M.D. CANTAB., F.R.C.P. LOND.
Assistant Physician to the London Hospital; Examiner in Medicine to the University of Durham, etc., etc.

A PRACTICAL TREATISE ON DISEASES OF THE KIDNEYS AND URINARY DERANGEMENTS. With Illustrations, crown 8vo, 10s. 6d. [Lewis's Practical Series.]

AMBROSE L. RANNEY, A.M., M.D.

Professor of the Anatomy and Physiology of the Nervous System in the New York Post-Graduate Medical School and Hospital; Professor of Nervous and Mental Diseases in the Medical Department of the University of Vermont.

THE APPLIED ANATOMY OF THE NERVOUS SYSTEM. Being a Study of this portion of the Human Body from a stand-point of its general interest and practical utility in Diagnosis, designed for use as a text-book and a work of reference. Second edit., 238 Illustrations, large 8vo, 21s. [*Just published.*

H. A. REEVES, F.R.C.S. EDIN.

Senior Assistant Surgeon and Teacher of Practical Surgery at the London Hospital; Surgeon to the Royal Orthopædic Hospital.

BODILY DEFORMITIES AND THEIR TREATMENT: A HANDBOOK OF PRACTICAL ORTHOPÆDICS. With numerous Illustrations, crown 8vo, 8s. 6d.
[LEWIS'S PRACTICAL SERIES].

RALPH RICHARDSON, M.A., M.D.

Fellow of the College of Physicians, Edinburgh.

ON THE NATURE OF LIFE: An Introductory Chapter to Pathology. Second edition, revised and enlarged. Fcap. 4to, 10s. 6d.

W. RICHARDSON, M.A., M.D., M.R.C.P.

REMARKS ON DIABETES, ESPECIALLY IN REFERENCE TO TREATMENT. Demy 8vo, 4s. 6d.

SAMUEL RIDEAL, D.SC. (LOND.), F.I.C., F.C.S., F.G.S.

Fellow of University College, London.

PRACTICAL ORGANIC CHEMISTRY; The Detection and Properties of some of the more important Organic Compounds. 12mo, 2s. 6d. [*Just published.*

E. A. RIDSDALE.

Associate of the Royal School of Mines.

COSMIC EVOLUTION; being Speculations on the Origin of our Environment. Fcap. 8vo, 3s. [*Just published.*

SYDNEY RINGER, M.D., F.R.S.

Professor of the Principles and Practice of Medicine in University College; Physician to and Professor of Clinical Medicine in, University College Hospital.

I.

A HANDBOOK OF THERAPEUTICS. Twelfth Edition, thoroughly revised, 8vo, 15s. [*Just published.*

II.

ON THE TEMPERATURE OF THE BODY AS A MEANS OF DIAGNOSIS AND PROGNOSIS IN PHTHISIS. Second edition, small 8vo, 2s. 6d.

FREDERICK T. ROBERTS, M.D., B.SC., F.R.C.P.

Examiner in Medicine at the University of London; Professor of Therapeutics and of Clinical Medicine in University College; Physician to University College Hospital; Physician to Brompton Consumption Hospital, &c.

I.

A HANDBOOK OF THE THEORY AND PRACTICE OF MEDICINE. Seventh edition, with Illustrations, in one volume, large 8vo, 21s. [*Just published.*

*** *Copies may also be had bound in two volumes cloth for* 1s. 6d. *extra.*

II.

THE OFFICINAL MATERIA MEDICA. Second edition, entirely rewritten in accordance with the latest British Pharmacopœia, fcap. 8vo, 7s. 6d.

R. LAWTON ROBERTS, M.D., M.R.C.S.

Honorary Life Member of, and Lecturer and Examiner to, the St. John Ambulance Association.

ILLUSTRATED LECTURES ON AMBULANCE WORK. Third edition copiously Illustrated, crown 8vo, 2s. 6d. [*Now ready.*

D. B. St. JOHN ROOSA, M.A., M.D.

Professor of Diseases of the Eye and Ear in the University of the City of New York; Surgeon to the Manhattan Eye and Ear Hospital.

A PRACTICAL TREATISE ON THE DISEASES OF THE EAR, including the Anatomy of the Organ. Sixth edition, Illustrated by wood engravings and chromo-lithographs, large 8vo, 25s.

ROBSON ROOSE, M.D.

Fellow of the Royal College of Physicians in Edinburgh.

I.

GOUT, AND ITS RELATIONS TO DISEASES OF THE LIVER AND KIDNEYS. Sixth Edition, crown 8vo, 3s. 6d.
[*Just published.*

II.

NERVE PROSTRATION AND OTHER FUNCTIONAL DISORDERS OF DAILY LIFE. Crown 8vo, 10s. 6d.

BERNARD ROTH, F.R.C S.

Fellow of the Medical Society of London; Member of the Clinical and Pathological Societies, and of the Medical Officers of Schools' Association.

THE TREATMENT OF LATERAL CURVATURE OF THE SPINE. With Photographic and other Illustrations, demy 8vo, 5s. [*Just Published.*

J. BURDON SANDERSON, M.D., LL.D., F.R.S.

Jodrell Professor of Physiology in University College, London.

UNIVERSITY COLLEGE COURSE OF PRACTICAL EXERCISES IN PHYSIOLOGY. With the co-operation of F. J. M. PAGE, B.Sc., F.C.S.; W. NORTH, B.A., F.C.S., and AUG. WALLER, M.D. Demy 8vo, 3s. 6d.

W. H. O. SANKEY, M.D. LOND., F.R.C.P.

Late Lecturer on Mental Diseases, University College, London, etc.

LECTURES ON MENTAL DISEASE. Second Edition, with coloured plates, 8vo, 12s. 6d.

JOHN SAVORY.

Member of the Society of Apothecaries, London.

A COMPENDIUM OF DOMESTIC MEDICINE AND COMPANION TO THE MEDICINE CHEST: Intended as a source of easy reference for Clergymen, Master Mariners, and Travellers; and for Families resident at a distance from professional assistance. Tenth Edition, sm. 8vo, 5s.

DR. B. S. SCHULTZE.

Professor of Gynecology; Director of the Lying-in Hospital, and of the Gynecological Clinic at Jena.

THE PATHOLOGY AND TREATMENT OF DISPLACEMENTS OF THE UTERUS. Translated by J. J. Macan, M.A., M.R.C.S. and edited by A. V. Macan, M.B., M.Ch., Master of the Rotunda Lying-in Hospital, Dublin. With 120 Illustrations, medium 8vo, 12s. 6d.

[*Now ready.*

JOHN V. SHOEMAKER, A.M., M.D.

Professor of Skin Diseases in the Medico-Chirurgical College and Hospital of Philadelphia; Physician to the Philadelphia Hospital for Diseases of the Skin.

A PRACTICAL TREATISE ON DISEASES OF THE SKIN. Coloured Plates and other Illustrations, large 8vo, 24s.

WM. JAPP SINCLAIR, M.A., M.D.

Honorary Physician to the Manchester Southern Hospital for Women and Children, and Manchester Maternity Hospital.

ON GONORRHŒAL INFECTION IN WOMEN. Post 8vo, 4s.

A. J. C. SKENE, M.D.

Professor of Gynecology in the Long Island College Hospital, Brooklyn, New York.

TREATISE ON THE DISEASES OF WOMEN, FOR THE USE OF STUDENTS AND PRACTITIONERS. Nine coloured plates and 251 engravings, large 8vo, 28s.

ALDER SMITH, M.B. LOND., F.R.C.S.

Resident Medical Officer, Christ's Hospital, London.

RINGWORM: Its Diagnosis and Treatment. Third Edition, enlarged, with Illustrations, fcap. 8vo, 5s. 6d.

J. LEWIS SMITH, M.D.

Physician to the New York Infants' Hospital; Clinical Lecturer on Diseases of Children in Bellevue Hospital Medical College.

A TREATISE ON THE DISEASES OF INFANCY AND CHILDHOOD. Fifth Edition, with Illustrations, large 8vo, 21s.

FRANCIS W. SMITH, M.B., B.S.

THE SALINE WATERS OF LEAMINGTON. Second Edit., with Illustrations, crown 8vo, 1s. *nett.*

JOHN KENT SPENDER, M.D. LOND.

Physician to the Royal Mineral Water Hospital, Bath.

THE EARLY SYMPTOMS AND THE EARLY TREATMENT OF OSTEO-ARTHRITIS, commonly called Rheumatoid Arthritis, with special reference to the Bath Thermal Waters. Sm. 8vo. 2s. 6d. [*Just published.*

LOUIS STARR, M.D.

Clinical Professor of Diseases of Children in the Hospital of the University of Pennsylvania; Physician to the Children's Hospital, Philadelphia, &c.

HYGIENE OF THE NURSERY. Including the General Regimen and Feeding of Infants and Children, and the Domestic Management of the Ordinary Emergiences of Early Life. Second edition, with Illustrations, crown 8vo, 3s. 6d. [*Just published.*

JAMES STARTIN, M.B., M.R.C.S.

Surgeon and Joint Lecturer to St. John's Hospital for Diseases of the Skin.

LECTURES ON THE PARASITIC DISEASES OF THE SKIN. VEGETOID AND ANIMAL. With Illustrations, crown 8vo, 2s. 6d.

W. R. H. STEWART, F.R.C.S., L.R.C.P. EDIN.

Aural Surgeon to the Great Northern Central Hospital; Surgeon to the London Throat Hospital, &c.

EPITOME OF DISEASES AND INJURIES OF THE EAR, with a Chapter on Naso-Pharyngeal Diseases causing Deafness. Demy 32mo, 2s. 6d. [*Just published.*

LEWIS A. STIMSON, B.A., M.D.

Surgeon to the Presbyterian and Bellevue Hospitals; Professor of Clinical Surgery in the Medical Faculty of the University of the City of New York, &c.

A MANUAL OF OPERATIVE SURGERY.
Second Edition, with three hundred and forty-two Illustrations, post 8vo, 10s. 6d.

ADOLF STRÜMPELL.

Director of the Medical Clinic in the University of Erlangen.

A TEXT-BOOK OF MEDICINE FOR STUDENTS AND PRACTITIONERS. Translated from the latest German edition by Dr. H. F. VICKERY and Dr. P. C. KNAPP, with Editorial Notes by Dr. F. C. SHATTUCK, Visiting Physician to the Massachusetts General Hospital, etc. Complete in one large vol., imp. 8vo, with 111 Illustrations, 28s.

JUKES DE STYRAP, M.K.Q.C.P., ETC.

Physician-Extraordinary, late Physician in Ordinary, to the Salop Infirmary; Consulting Physician to the South Salop and Montgomeryshire Infirmaries, etc.

THE MEDICO-CHIRURGICAL TARIFFS PREPARED FOR THE LATE SHROPSHIRE ETHICAL BRANCH OF THE BRITISH MEDICAL ASSOCIATION. Fourth Edition, fcap. 4to, revised and enlarged, 2s. *nett.*

C. W. SUCKLING, M.D. LOND., M.R.C.P.

Professor of Materia Medica and Therapeutics at the Queen's College, Physician to the Queen's Hospital, Birmingham, etc.

ON THE DIAGNOSIS OF DISEASES OF THE BRAIN, SPINAL CORD, AND NERVES. With Illustrations, crown 8vo, 8s. 6d.

JOHN BLAND SUTTON, F.R.C.S.

Lecturer on Comparative Anatomy, Senior Demonstrator of Anatomy, and Assistant Surgeon to the Middlesex Hospital; Erasmus Wilson Lecturer, Royal College of Surgeons, England.

LIGAMENTS: THEIR NATURE AND MORPHOLOGY. With numerous Illustrations, post 8vo, 4s. 6d.

HENRY R. SWANZY, A.M., M.B., F.R.C.S.I.

Examiner in Ophthalmic Surgery in the Royal University of Ireland, and to the Conjoint Board of the King and Queen's College of Physicians and Royal College of Surgeons, Ireland; Surgeon to the National Eye and Ear Infirmary, Dublin, etc.

A HANDBOOK OF THE DISEASES OF THE EYE AND THEIR TREATMENT. Second Edition, Illustrated with wood-engravings, colour tests, etc., small 8vo, 10s. 6d. [*Just published.*

EUGENE S. TALBOT, M.D., D.D.S.

Professor of Dental Surgery in the Woman's Medical College; Lecturer on Dental Pathology and Surgery in Rush Medical College, Chicago.

IRREGULARITIES OF THE TEETH AND THEIR TREATMENT. With 152 Illustrations, royal 8vo, 10s. 6d.

JOHN DAVIES THOMAS, M.D. LOND., F.R.C.S. ENG.
Physician to the Adelaide Hospital, S. Australia.

I.

HYDATID DISEASE, WITH SPECIAL REFERENCE TO ITS PREVALENCE IN AUSTRALIA. Demy 8vo, 10s. 6d.

II.

HYDATID DISEASE OF THE LUNGS. Demy 8vo, 2s.

HUGH OWEN THOMAS, M.R.C.S.

I.

DISEASES OF THE HIP, KNEE, AND ANKLE JOINTS, with their Deformities, treated by a new and efficient method. Third Edition, 8vo, 25s.

II.

CONTRIBUTIONS TO SURGERY AND MEDICINE:—

PART 1.—Intestinal Obstruction; with an Appendix on the Action of Remedies. 10s.

, 2.—The Principles of the Treatment of Joint Disease, Inflammation, Anchylosis, Reduction of Joint Deformity, Bone Setting. 5s.

,, 3.—Fractures, Dislocations, Diseases and Deformities of the Bones of the Trunk and Upper Extremities. 10s.

,, 4.—The Collegian of 1666 and the Collegians of 1885; or what is recognised treatment? Second Edition, 1s.

,, 5.—On Fractures of the Lower Jaw. 1s.

,, 6.—The Principles of the Treatment of Fractures and Dislocations. 10s.

,, 8.—The Inhibition of Nerves by Drugs. Proof that Inhibitory Nerve-Fibres do not exist. 1s.

(Parts 7, 9 and 10 are in preparation).

J. ASHBURTON THOMPSON, M.R.C.S.
Late Surgeon at King's Cross to the Great Northern Railway Company.

FREE PHOSPHORUS IN MEDICINE WITH SPE- CIAL REFERENCE TO ITS USE IN NEURALGIA. A contribution to Materia Medica and Therapeutics. An account of the History, Pharmaceutical Preparations, Dose, Internal Administration, and Therapeutic uses of Phosphorus; with a Complete Bibliography of this subject, referring to nearly 200 works upon it. Demy 8vo, 7s. 6d.

J. C. THOROWGOOD, M.D.
Assistant Physician to the City of London Hospital for Diseases of the Chest.

THE CLIMATIC TREATMENT OF CONSUMPTION AND CHRONIC LUNG DISEASES. Third Edition, post 8vo, 3s 6d.

FREDERICK TREVES, F.R.C.S.
Hunterian Professor at the Royal College of Surgeons of England; Surgeon to and Lecturer on Anatomy at the London Hospital.

THE ANATOMY OF THE INTESTINAL CANAL AND PERITONEUM IN MAN. Hunterian Lectures, 1885. 4to, 2s. 6d.

D. HACK TUKE, M.D., LL.D.
Fellow of the Royal College of Physicians, London.

THE INSANE IN THE UNITED STATES AND CANADA. Demy 8vo, 7s. 6d.

DR. R. ULTZMANN.

ON STERILITY AND IMPOTENCE IN MAN. Translated from the German with notes and additions by ARTHUR COOPER, L.R.C.P., M.R.C.S., Surgeon to the Westminster General Dispensary. With Illustrations, fcap. 8vo, 2*s.* 6*d.*

W. H. VAN BUREN, M.D., LL.D.
Professor of Surgery in the Bellevue Hospital Medical College.

DISEASES OF THE RECTUM: And the Surgery of the Lower Bowel. Second Edition, with Illustrations, 8vo, 14s.

RUDOLPH VIRCHOW, M.D.
Professor in the University, and Member of the Academy of Sciences of Berlin, &c., &c.

INFECTION-DISEASES IN THE ARMY, Chiefly Wound Fever, Typhoid, Dysentery, and Diphtheria. Translated from the German by JOHN JAMES, M.B., F.R.C.S. Fcap. 8vo, 1s. 6d.

ALFRED VOGEL, M.D.
Professor of Clinical Medicine in the University of Dorpat, Russia.

A PRACTICAL TREATISE ON THE DISEASES OF CHILDREN. Third Edition, translated and edited by H. RAPHAEL, M.D., from the Eighth German Edition, illustrated by six lithographic plates, part coloured, royal 8vo, 18s.

A. DUNBAR WALKER, M.D., C.M.

THE PARENT'S MEDICAL NOTE BOOK. Oblong post 8vo, cloth, 1s. 6d.

JOHN RICHARD WARDELL, M.D. EDIN., F.R.C.P. LOND.
Late Consulting Physician to the General Hospital Tunbridge Wells.

CONTRIBUTIONS TO PATHOLOGY AND THE PRAC- TICE OF MEDICINE. Medium 8vo, 21s.

W. SPENCER WATSON, F.R.C.S. ENG., B.M. LOND.
Surgeon to the Great Northern Hospital; Surgeon to the Royal South London Ophthalmic Hospital.

I.

DISEASES OF THE NOSE AND ITS ACCESSORY CAVITIES. Profusely Illustrated. Demy 8vo, 18s.

II.

EYEBALL-TENSION: Its Effects on the Sight and its Treatment. With woodcuts, p. 8vo, 2s. 6d.

III.

ON ABSCESS AND TUMOURS OF THE ORBIT. Post 8vo, 2s. 6d.

FRANCIS H. WELCH, F.R.C.S.
Surgeon Major, A.M.D.

ENTERIC FEVER: as Illustrated by Army Data at Home and Abroad, its Prevalence and Modifications, Ætiology, Pathology and Treatment. 8vo, 5s. 6d.

W. WYNN WESTCOTT, M.B.
Deputy Coroner for Central Middlesex.

SUICIDE; its History, Literature, Jurisprudence, and Prevention. Crown 8vo, 6s.

E. G. WHITTLE, M.D. LOND., F.R.C.S. ENG.
Senior Surgeon to the Royal Alexandra Hospital for Sick Children, Brighton.

CONGESTIVE NEURASTHENIA, OR INSOMNIA AND NERVE DEPRESSION. Crown 8vo, 3s. 6d.
[*Just published.*

JOHN WILLIAMS, M.D., F.R.C.P.
Professor of Midwifery in University College, London; Obstetric Physician to University College Hospital; Physician Accoucheur to H.R.H. Princess Beatrice, etc.

CANCER OF THE UTERUS: Being the Harveian Lectures for 1886. Illustrated with Lithographic Plates, royal 8vo, 10s. 6d.

E. T. WILSON, B.M. OXON., F.R.C.P. LOND.
Physician to the Cheltenham General Hospital and Dispensary.

DISINFECTANTS AND HOW TO USE THEM. In Packets of one doz. price 1s.

DR. F. WINCKEL.
Formerly Professor and Director of the Gynæcological Clinic at the University of Rostock.

THE PATHOLOGY AND TREATMENT OF CHILDBED: A Treatise for Physicians and Students. Translated from the Second German edition, with many additional notes by the Author, by J. R. CHADWICK, M.D. 8vo, 14s.

BERTRAM C. A. WINDLE, M.A., M.D. DUBL.
Professor of Anatomy in the Queen's College, Birmingham.

A HANDBOOK OF SURFACE ANATOMY AND LANDMARKS. Post 8vo, illustrations, 3s. 6d.

EDWARD WOAKES, M.D. LOND.

Senior Aural Surgeon and Lecturer on Aural Surgery at the London Hospital; Surgeon to the London Throat Hospital.

I.

ON DEAFNESS, GIDDINESS AND NOISES IN THE HEAD.

VOL. I.—POST-NASAL CATARRH, AND DISEASES OF THE NOSE CAUSING DEAFNESS. With Illustrations, cr. 8vo, 6s. 6d.

VOL. II.—ON DEAFNESS, GIDDINESS AND NOISES IN THE HEAD. Third Edition, with Illustrations, cr. 8vo. [*In preparation.*

II.

NASAL POLYPUS: WITH NEURALGIA, HAY-FEVER, AND ASTHMA, IN RELATION TO ETHMOIDITIS. With Illustrations, cr. 8vo, 4s. 6d.

DAVID YOUNG, M.C., M.B., M.D.

Licentiate of the Royal College of Physicians, Edinburgh; Licentiate of the Royal College of Surgeons, Edinburgh, etc.

ROME IN WINTER AND THE TUSCAN HILLS IN SUMMER. A CONTRIBUTION TO THE CLIMATE OF ITALY. Small 8vo, 6s.

HERMANN VON ZEISSL, M.D.

Late Professor at the Imperial Royal University of Vienna.

OUTLINES OF THE PATHOLOGY AND TREAT-MENT OF SYPHILIS AND ALLIED VENEREAL DISEASES. Second Edition, revised by M. VON ZEISSL, M.D., Privat-Docent for Diseases of the Skin and Syphilis at the Imperial Royal University of Vienna. Translated, with Notes, by H. RAPHAEL, M.D., Attending Physician for Diseases of Genito-Urinary Organs and Syphilis, Bellevue Hospital, Out-Patient Department. Large 8vo, 18s. [*Just published*

Clinical Charts For Temperature Observations, etc.
Arranged by W. RIGDEN, M.R.C.S. 50s. per 1000, 28s. per 500, 15s. per 250, 7s. per 100, or 1s. per dozen.

Each Chart is arranged for four weeks, and is ruled at the back for making notes of cases; they are convenient in size, and are suitable both for hospital and private practice.

THE NEW SYDENHAM SOCIETY'S PUBLICATIONS.

President :—W. T. Gairdner, M.D., LL.D.
Honorary Secretary :—Jonathan Hutchinson, Esq., F.R.S.
Treasurer :—W. Sedgwick Saunders, M.D., F.S.A.

Annual Subscription, One Guinea.

The Society issues translations of recent standard works by continental authors on subjects of general interest to the profession.

Amongst works recently issued are "Spiegelberg's Midwifery," "Hirsch's Historical and Geographical Pathology," "Essays on Micro-Parasites," works by Charcot, Duchenne, Begbie, Billroth, Graves, Koch, Hebra, Guttmann, etc.

The Society also has in hand an Atlas of Pathology with Coloured Plates, and a valuable and exhaustive "Lexicon of Medicine and the Allied Sciences."

The Annual Report, with full list of works published, and all further information will be sent on application.

PERIODICAL WORKS PUBLISHED BY H. K. LEWIS.

THE BRITISH JOURNAL OF DERMATOLOGY. Edited by Malcolm Morris and H. G. Brooke. Published monthly, 1s. Annual Subscription 12s. post free.

THE NEW YORK MEDICAL JOURNAL. A Weekly Review o Medicine. Annual Subscription, One Guinea, post free.

THE THERAPEUTIC GAZETTE. A Monthly Journal, devoted to the Science of Pharmacology, and to the introduction of New Therapeutic Agents. Edited by Drs. H. C. Wood and R. M. Smith. Annual Subscription, 10s., post free.

THE GLASGOW MEDICAL JOURNAL. Published Monthly. Annual Subscription, 20s., post free. Single numbers, 2s. each.

LIVERPOOL MEDICO-CHIRURGICAL JOURNAL, including the Proceedings of the Liverpool Medical Institution. Published twice yearly, 3s. 6d. each number.

TRANSACTIONS OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA. Volumes I. to VI., 8vo, 10s. 6d. each.

MIDDLESEX HOSPITAL, REPORTS OF THE MEDICAL, SURGICAL, AND Pathological Registrars for 1883 to 1887. Demy 8vo, 2s. 6d. *nett* each volume.

*** Mr. Lewis is in constant communication with the leading publishing firms in America, and has transactions with them for the sale of his publications in that country. Advantageous arrangements are made in the interests of Authors for the publishing of their works in the United States.

Mr. Lewis's publications can be procured of all Booksellers in any part of the world.

London: Printed by H. K. Lewis, 136 Gower Street, W.C.